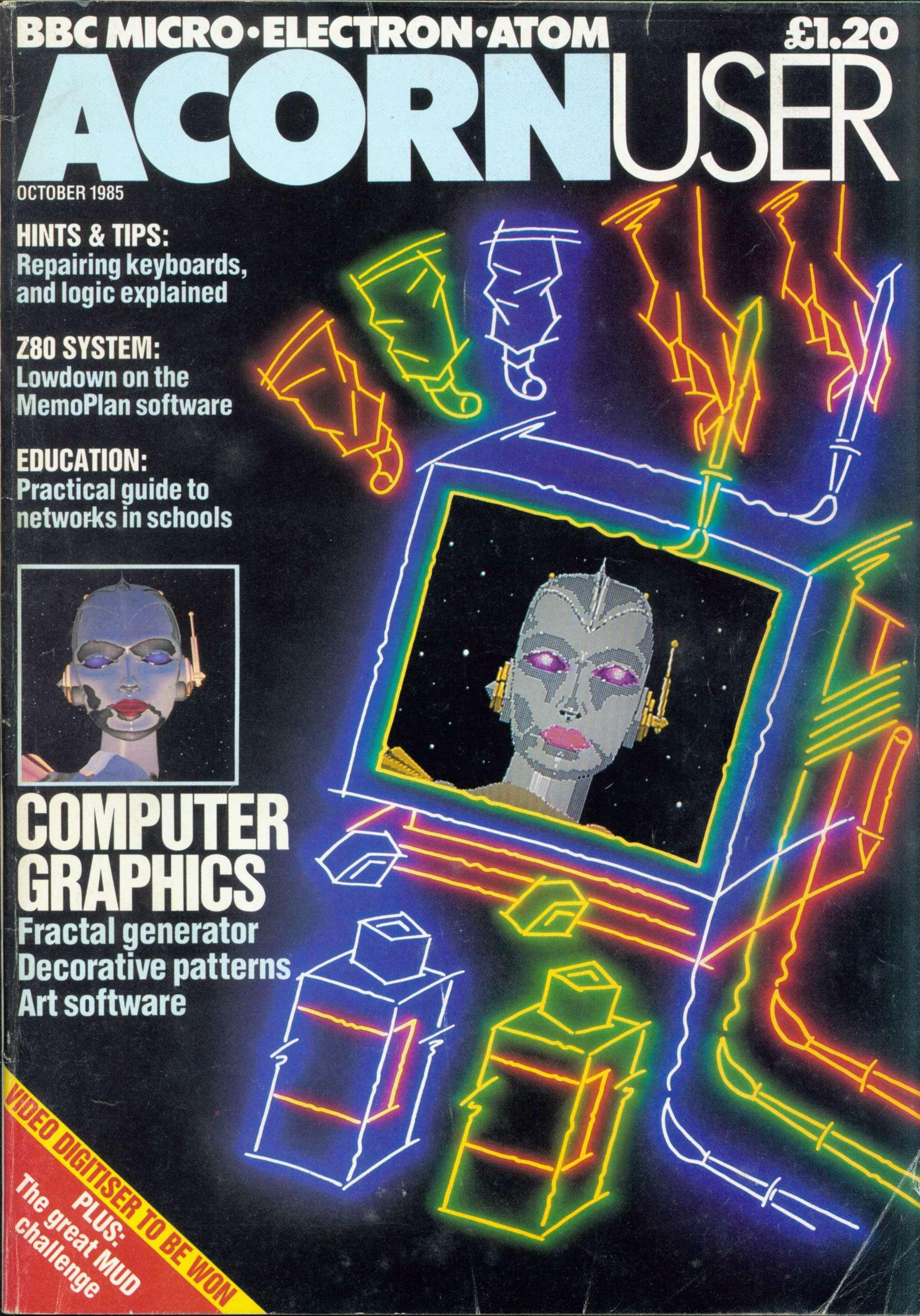
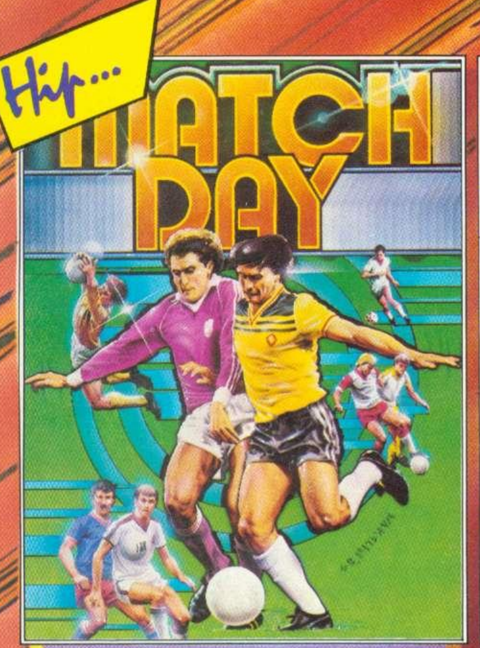
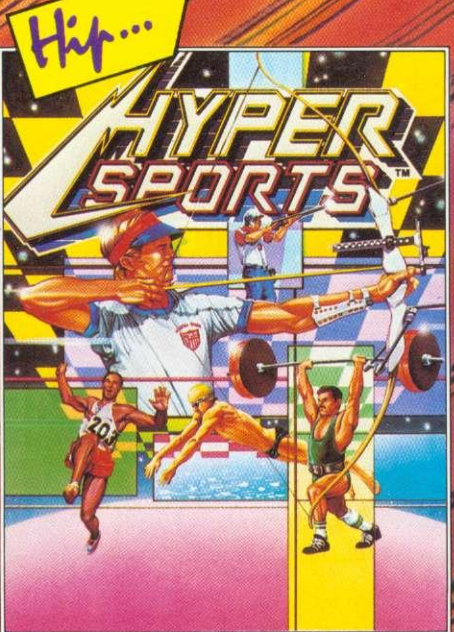

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OCTOBER 1985
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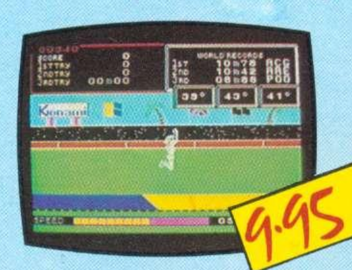
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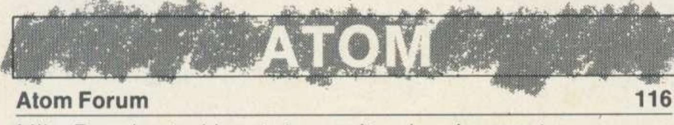


, WHSMITH, John Menzies, WOOLWORTH, LASKYS, Rumbelows, Greens, Spectrum Shops and all good software deale

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FEATURES

EDUCATION



ATOM

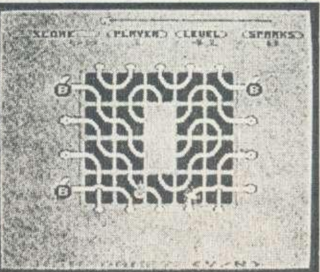
YELLOW PAGES

The major listings for this issue are printed in the yellow section starting on page 97. These are also available on cassette (which includes a tape-to-disc transfer routine and index program) and in bar code format to save you typing them in. Details of how to order these on pages 93 and 106

SPECIAL DISC

For this issue only, we've made the programs listed in *Acorn User* available on disc. It will also include many graphics screens we can't fit onto the monthly listings cassette. See page 93

REVIEWS



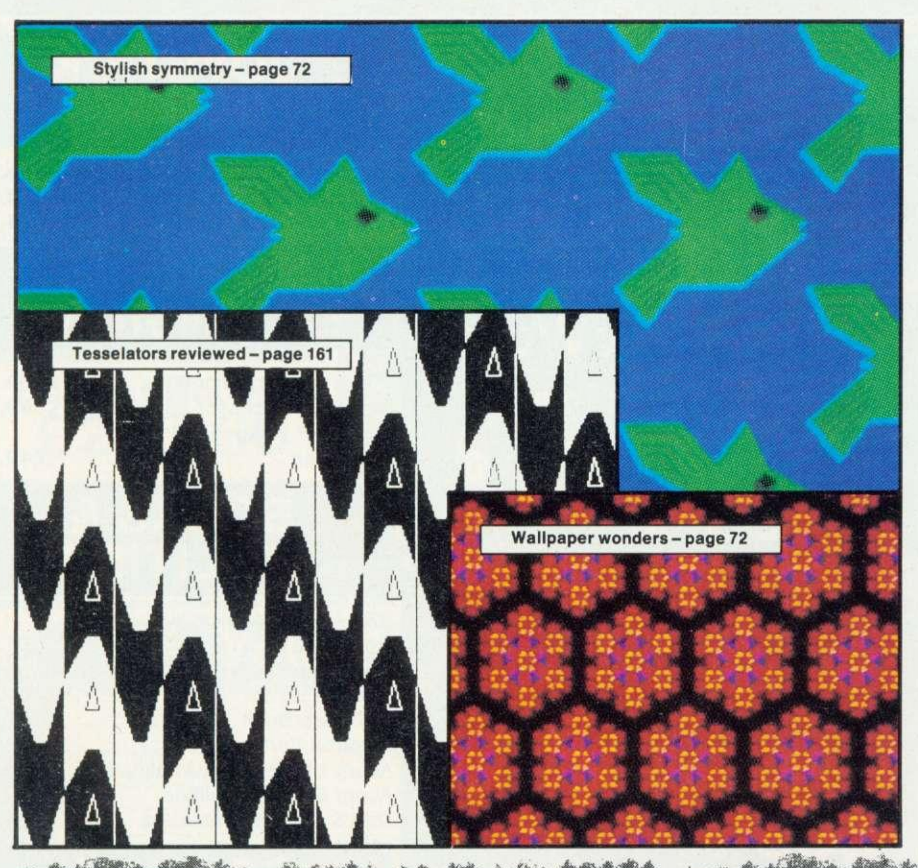
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GRAPHICS SPECIAL — OCTOBER



GRAPHICS

NEW USERS

BUSINESS



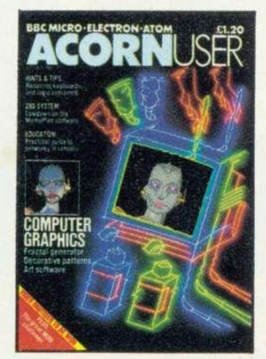
Maths in motion – draw mathematical figures on screen

Compilers – explained and reviewed

Monitors monitored by Chris Drage

EPROM programmers compared

Graphics wisdom from Chris Steele, and McGregor and Watt



Acorn User
October 1985
Issue number 39

This month's cover shows the face of Brilliance, a robot woman produced by Robert Abel Associates of California – one of the world's foremost computer graphics companies. They used a Cray supercomputer to animate the figure in a television advertisement for the American Canned Food Association. Alongside it is a screen shot of a BBC micro version by Malcolm Banthorpe. The illustration is by Stuart Briers/Roger Phillips

PUBLISHER'S ANNOUNCEMENT

Following an agreement between Redwood Publishing and the Rushworth Dales Group *Acorn User's* advertising department has moved in-house. Any company who would like a copy of our advertising rates and information should contact either Simon Goode or Jonathan Rawlins on 01-836 2441. All copy should be sent to Acorn User Advertisement Department, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

Notes for authors

Acorn User welcomes submissions from readers. Articles should be typed, double-spaced text with diagrams and screen dumps on separate sheets, or on disc in *Wordwise* (saved as a *SPOOL file using option 8) or *View* format. Leave large margins to allow space for editing.
Please enclose all programs on disc or cassette, with listings if possible. Also follow the style used in presenting listings in the yellow pages section. Photos should be 35mm, or larger, transparencies, or 5in by 7in black and white prints. Ensure your name is on everything, and keep a copy. Enclose a suitable stamped, addressed envelope if the submission is to be returned. Attach a short letter with the article giving its title with a daytime phone number if possible. Address your article to the Technical editor. Articles are acknowledged on receipt, but not submissions for the regular columns, letters pages and competitions. Please limit telephone enquiries to the Technical editor to Wednesday and Thursday afternoons.



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News in brief

■ ANYONE with an interest in robotics and control should look out for **The Robot Book** by **Richard Pawson**. For £9.95 it gives a colourful and succinct introduction to all aspects of the subject written in a very readable style. The publisher is **Windward**, a subsidiary of WH Smith.

■ MEANWHILE the **BBC** is doing its best to rid us of techno fear with the **Inside Information** project. It covers the whole area of computers, video and communications and is designed for people who know nothing about any of it.

Not only is there a **Radio 4** series fronted by **Paul Heiney** from October 12, but also a book of the same name by **Jacquetta Megarry** at £8.95 and six programs for BBC Micro and Electron by **Mehran Shalisaver** at £12.95 for the lot. Details from the Software Dept at 35 Marylebone High Street, London W1M 4AA. Tel: 01-927 4128.

■ THEY say Christmas comes but once a year and **Chalksoft** has already started the ball rolling with **Carols.** The tape plays tunes, draws pictures and has a game included – all for a fiver. Tel: (0775) 69518.

■ SWOTS who want to brush up on their **'O' level** and **GCE** courses now have the option of doing it on computer with the **Letts Keyfacts** software. Each of the seven titles costs £11.50 and comes with two tapes. It runs on the BBC micro and Electron.

■ LEVEL 9 is soon to release **Worm in Paradise** the final part of the Silicon Dream trilogy of *Snowball* and *Return to Eden*. Until then **Red Moon** is still baffling readers at £6.95. The BBC micro version is text-only.

■ SOFTWARE for toddlers from **ESM** covers colours, shapes, left and right, and shape recognition. The seven programs for nursery and infant education cost £14.95 on tape or disc. 32A Bridge Street, Cambridge CB2 1UJ.

■ THE **Irish Man** is a free **bulletin board** run by 16-year-old Mark Stringer from Bangor in County Down. It runs seven days a week from 9-11pm and features a music section. Tel: (0247) 455162.



Communicator silence

ACORN is still keeping quiet about the Communicator, a computer with built-in telephone and a competitor to ICL's QL-based One Per Desk. This picture appeared in a recent issue of *Design* magazine, and as we went to press the Communicator's appearance at the PCW Show was in doubt.

Acorn will not market the machine directly, but instead build it for OEMs – companies which put their own name on a computer and sell it on or use it in-house.

Acorn beats world to super-fast chip

ACORN has taken a major step forward in computer technology by building the first in a new generation of chips – a 32-bit 'Risc' microprocessor. When attached to the BBC micro as a second processor it outperforms Acorn's 32016-based Workstation and even Vax mainframes on standard industry timing benchmarks.

A range of computers will be built around the chip, but these are still top secret. However, Acorn's US research base in California's Silicon Valley is working on advanced office systems which desperately need the speed such a chip could provide.

The performance of the chip – which worked first time – was undoubtedly a factor which encouraged Olivetti to stay with Acorn. News of the success came when negotiations on the refinancing package were at a critical stage.

The influential American magazine *Electronics* has hinted that AT&T, which owns a large chunk of Olivetti, might be a potential customer for the technology. AT&T is one of the world's largest companies, and a senior executive, James Edwards, is already on the Acorn board.

The chip is called ARM, Acorn Risc Machine (Risc stands for reduced instruction set computer). It is designed to do a limited set of tasks very quickly, and is the result of the latest thinking in chip design.

ARM has been heralded as the first commercial Risc microprocessor, and was developed by a special design group in Cambridge.

Board changes

ALEX Reid resigns as chairman and Alessandro Uboldi takes over. Brian Long, as managing director, looks after the day-to-day running of the company.

The two Acorn founders, Chris Curry and Hermann Hauser, resign as deputy chairmen but stay on the board as ordinary directors.

The new Acorn Computer Group plc board will be: Alessandro Uboldi (Olivetti, chairman); Brian Long (Olivetti, managing director); Hermann Hauser and Chris Curry (directors); James Edwards (AT&T), Elserino Piol (Olivetti), Bruno Soggiu (Olivetti), John Sutherland and Christopher Ward (non-executive directors).

City cool over Acorn's return

CITY analysts gave a cool reception to Acorn's shares on their return to the Unlisted Securities Market following a seven-week suspension while a second refinancing package was thrashed out by Olivetti.

The Stock Market restored Acorn Computer Group to the Unlisted Securities Market on August 13, with Italian computer giant Olivetti owning 80 per cent of Acorn shares.

The new shares climbed from a starting point of 2.5p, demonstrating initial confidence in the company, despite provisional losses for the year of almost £28m.

Turnover for the first six months of 1985, at £23m, was half that of the same period last year. The shares were suspended in June at 11p, having reached a high this year of 175p.

Despite a major slimming down Acorn's long-term future is still uncertain, according to some stock market analysts. David Gibbons of stockbrokers James Capel, said: 'Acorn is still eating cash and it's not clear when it will be back in profit'.

Acorn is still seen as a viable company if it can come up with innovative new products or conquer overseas education markets.



Central Hall, Westminster, 22nd-23rd November, 1985.

Today's the day to get your Christmas shopping started!
Because today's the day we're announcing a new Christmas computer event – the Acorn User Christmas Show. And the coupon below brings you straight-past-the-queue advance tickets ... saves you £1 or more on the entrance money ... and *automatically* enters you into the draw for Acorn products worth £500! It's the only way we know to make Christmas shopping fun.

When? And where? And who?
The Acorn User Christmas Show is on Friday and Saturday, 22nd and 23rd November, at The Central Hall, Westminster.
The Central Hall is near the Houses of Parliament. It's easy to get to, and it's big to make a really busy show comfortable. (Who needs another West End crush?)
There'll be the most comprehensive range of hardware and software – for business, education, scientific and home use.
The list of exhibitors is growing daily. Like visitors, they had a great time in July, and they're looking forward to launch their latest products.

ACORN PRODUCTS WORTH £500 TO BE WON!
Every advance ticket issued automatically enters the prize draw.

"The latest additions for our Zero-2 robot" Intergalactic Robots
"We'll certainly be there in November" – Cumana
"Even better in November" – Micromedia
"Christmas is a really good idea" – Commotion
These are just some of the comments from the first of the Show's exhibitors to take exhibition space. That sort of enthusiasm guarantees an unmissable event.

HOW TO GIVE YOUR ACORN A CHRISTMAS PRESENT
(And get one for yourself while you're at it!)

TICKET APPLICATION FORM
To: Edition Scheme Ltd, HR House, 447 High Rd, Finchley, London N12 0AF. Tel: 01-346 6566/7.
Please supply ____ (qty) adult tickets at £2 (if total bookings are less than 10) or £1 (if total bookings are more than 10)
____ (qty) under-sixteen tickets at £1.
I enclose cheque/P.O. for £____

Signature ____
Name ____
Address ____
____
Postcode ____

What you save by posting the ticket application coupon today.
For everybody ... cut out the queueing! Ticket holders walk straight to the door and into the Show.
For individuals ... you save £1 per head on entry. Admission at the door will be £3 per head for adults, £2 per head for under-sixteens.
For groups ... of ten or more people, you save an extra £1 per adult. Post the application form today!

Edition Scheme Ltd,
HR House, 447 High Road,
Finchley, London N12 0AF.
Tel: 01-346 6566/7

You can be sure the Acorn User Christmas Show will have whatever's best and newest for you to buy right there and take away.



News in brief

□COMPUTER Concepts is to use protected EPROMs for its ROM-based software in a bid to discourage software piracy.

The move follows the recent furore over *Acorn User*'s User-RAM sideways RAM board, which was accused of encouraging illegal copying of commercial ROM software.

But Computer Concepts' Rob Pickering said the timing was coincidental: 'We've been looking to do this for three years, but only recently has the price of these protected hybrid EPROMs come down to a level where we can afford to use them without increasing our retail prices.'

All Computer Concepts' new releases will be in this protected form and although ROM software can be copied to sideways RAM boards, the copy will not run correctly.

The move was prompted by a 'marked increase' in software piracy according to Pickering but he could not put any figures to the statement.

Among the other ROM software publishers, Watford Electronics had no plans to use hybrid ROMs and Beebugsoft was not available to comment.

□WORDWISE Plus owners can expand its text handling capacity with the *Continuous Processing* ROM.

The ROM costs £15 and allows even large documents to be previewed in 80-column mode. Documents are split into smaller files which are chained together by the ROM.

Further details from Norwich Computer Services on (0603) 621157.

□PAY-OFF is claimed to be the 'adventurer's adventure game'. It has no instructions or hints and concerns the seamier side of life – gambling, two-bit hoodlums and a heavy called Luigi.

The game costs £5.95 for the BBC micro (£7.95 on disc) and an Electron version will be available next month. Bignose Software, 320 The Knares, Basildon, Essex SS16 5SW.

□MIDWICH has produced a range of Winchester disc drives for BBC micro econet systems.

Capacities available include five, 10 and 20 megabytes and add-on units allow expansion up to a maximum of 40 megabytes. The five megabyte unit costs £675, further details from Midwich on (0379) 4131.





Will the end of the MEP see the demise of new projects like Microvitec's touch screen (left) and the bar code reader (above), which both received funding from it?

Fears over future of computing in schools

CLOSURE of the Microelectronics Education Programme (MEP) threatens the long term future of computer education in schools, although the provision of more immediate needs seems secure.

The MEP is due to be wound up by the Department of Education and Science in March 1986 and replaced by a new body, the Microelectronics Support Unit (MSU), with an annual budget of £1.2m. In addition the Department of Trade and Industry (DTI) will provide some £3.5m over the next three years for schools to spend on software.

The MSU is to act as a national information and resources centre with a Management Board reflecting 'wider educational interests'.

The Unit will take on board many of the duties of the MEP's 14 regional centres and seven specialist development units, which will close unless alternative sources of finance can be found – here the Government is hoping that the Local Education Authorities will step in. In-service training for teachers, on which the MEP is spending £1.8m this year, is to be taken over by LEAs and the MSU will concentrate on 'training the trainers'.

It seems that many of the MEP's everyday functions can be taken over by the MSU and LEAs. Said Ray Templeton, of the MEP's Chiltern Regional Centre: 'We've been in existence since 1972 with financial backing from Herts County Council. The MEP money is extra to that, so when it runs out we will have to cut back, but the Centre will continue.'

But if the future of the MEP's day-to-day operations seems secure, the fate of its strategic planning and development roles is less so. The MEP was responsible for such innovations as the BBC Buggy and the Bar Code Reader.

Mike Bostock, who heads the MEP's Applied Microelectronics in Education Unit at Newcastle, feared that the MSU would not push ahead with the next generation of 16-bit educational computers. He said: 'At a time when the rest of the world is acknowledging our lead in microelectronics education, we are shutting up shop.'

The DTI money for schools to buy software follows the 'Micros in Schools' scheme and again LEAs have to match DTI money pound-for-pound.

THE Government's plans for computer education in schools at a glance:

- Microelectronics Education Programme (MEP) to be disbanded in March 1986 and replaced by a new body, the Microelectronics Support Unit (MSU), under the auspices of the Department of Education and Science.
- MSU to run for five years with a total budget of £11m.
- MSU to act as central source of information for schools in England, Wales and Northern Ireland. Also to assist with the teaching of trainers and development of curriculum materials.
- Local Education Authorities (LEAs) to take on the in-service teacher training and supply of information at local and regional level.
- The Department of Trade and Industry (DTI) to provide £3.5m to schools over three years for the purchase of educational software.

Last projects set for release

THE MEP's threatened Applied Microelectronics in Education Unit has several new products lined up for the autumn, and they could prove to be its last.

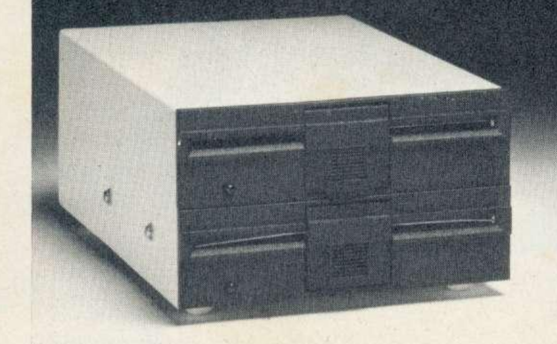
Vehicle Design **is a CAD system that allows children to design a car. Prototypes can be tested in a wind tunnel and '0–60' acceleration times calculated on screen.**

The MEP is also releasing primary school software in bar code form as a series of three books of programs.

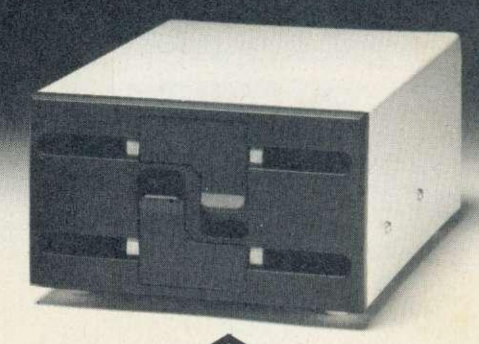
They are available for £2 each from Quorum Technical Services, Sandford Park Trading Estate, Corpus Street, Cheltenham, Glos.

Other MEP projects include: using bar codes for a school library, and some extra software to enhance the Microvitec touch screen.

Disc Drives from the Specialist







Special Offer

British Dual Drives
Single Sided £170
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- BBC compatible
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- Power supply models are also available
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- Weltec drives are ½ height and have brushless DC spindle motors

Price List (all prices inclusive of VAT & delivery)

	Description	Capacity	Order No	Price
Mical-Data Drives	Single Sided Dual Drive*	2 x 200k bytes (2 x 400k DD) 80 Track	TR1	**£170.00**
	Double Sided Dual Drive*	2 x 400k bytes (2 x 800k DD) 80 Track	TR2	**£230.00**
Weltec Drives	Single Sided Single Drive	100k bytes (200k DD) 40 Track	WT1	**£98.00**
	Double Sided Single Drive	200k bytes (400k DD) 40 Track	WT2	**£115.00**
	Double Sided Single Drive	400k bytes (800k DD) 80 Track	WT3	**£129.00**
	Double Sided Dual Drive*	2 x 200k bytes (2 x 400k DD) 80 Track	WT4	**£229.00**
	Double Sided Dual Drive*	2 x 400k bytes (2 x 400k DD) 80 Track	WT5	**£257.00**
3½" Drive	Double Sided Single Drive	400k bytes (800k DD) 80 Track	EP1	**£120.00**
	Power Supply unit for items marked * above add P to order no.			**£35.00**



Telephone Orders
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made payable to Mical-Data Ltd OR debit my Access/Visa account by this amount.

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Address________

TV documentary draws on BBC micro graphics

BBC Wales is using BBC micros to generate the graphics for a forthcoming medical TV documentary, the *Heart Programme*.

Two BBC micros are hooked up to a professional graphics system, the Pluto II, which has its own processor, ½ Megabyte of memory and a choice of over 16 million colours.

One Beeb acts as 'host' and controls the Pluto II via an interface card, while the other has a 6502 second processor and acts as 'number cruncher', calculating screen co-ordinates and passing them to the host machine.

Sharing the workload between two Beebs speeds up the design process, according to Carl Blundel who uses the system at BBC Wales' Cardiff studios.

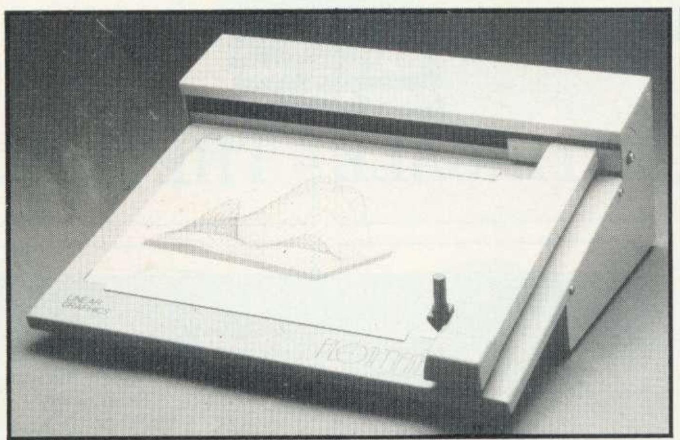
In one scene, Carl used the system to simulate the formation of a blood clot in the heart, with each frame being combined with conventional graphics before recording onto video tape.

He said: 'We've produced computer graphics using just BBC micros in other programmes, but hooking them up to a Pluto gives much higher resolution and a wider palette of colours.

'With the BBC financial cutbacks the Pluto system is a cheap way of producing computer-generated graphics.'

The Pluto II costs £2875 from IO Research, Exchange Buildings, High Street, Barnet, Herts EN5 5SY.

The BBC micro interface board for the Pluto costs £103.50 from PLB, 61/63 Beak Street, London W1.



Plotmate, launched by Linear Graphics in February, at under £300, has proved more versatile than anticipated. Uses include preparing transparencies for overhead projectors, drawing complex circuit diagrams and as a maths teaching aid.

Education sees massed attack

PARENTS searching for educational software for the Electron and BBC should look out for the BESA sign at dealers and shops.

BESA (British Educational Software Associates) is made up of eight educational software producers – ASK, Bourne Educational, Calpac, Collins, Griffin, Hill, MacGibbon, MacMillan and Widgit – who are determined to 'regain the confidence of the retailer and the end-user'.

They aim to do this by setting up a network of dealers who will order educational programs, demonstrate them and advise customers.

According to Martin Neild, Marketing Director of MacMillan Software and Deputy Chairman of BESA, the market for educational software has matured since the days when many software houses were pushing out poorly constructed programs with little educational value.

Working through distributors Proteus Computing the Association aims to set up an initial dealer base of some 200 outlets. Each shop will display the BESA logo and will carry 40 core titles, most of which will run on the BBC micro and Electron, covering a wide range of subjects for all ages.

Any title not on the shelves can be identified through the BESA catalogue of 250 titles and can be obtained from the dealer within a few days.

Further information about BESA from: Martin Neild at MacMillan Software on 01-836 6633, or from Barbara Warren at Calpac, on (04867) 2584.

FAST moves in on pirates

SOFTWARE pirates now face a tough time. New laws and heavy penalties are going through Parliament and an ex-policeman more used to dealing with riots and terrorist sieges will enforce them.

The Federation Against Software Theft (FAST) pressure group for the software industry has appointed Bob Hay, a former Chief Superintendent, as 'Enforcement Coordinator'. Hay helped run the command centre during the Iranian Embassy Siege and he was also in charge of policing the Southall riots.

Hay's job is to ensure that software pirates are brought to trial and that the new legislation, the Copyright (Computer Software) Amendment Law, which came into effect last month, actually works.

Under the Law, the maximum penalty for manufacturing or distributing pirated software is two years in prison or an unlimited fine.

Lateral thought saves lives

SUPERIOR Software is keen to assure people that there are no bugs in its *Repton* game for the Electron, following complaints from customers that it cannot be completed without losing a life.

One frustrated player was adamant that there must be a bug in the program and even suggested how to cure it!

Richard Hanson of Superior Software said: 'All twelve screens can be completed without losing a life. Screen J seems to cause the most problems; some lateral thought is required to complete it.'

Acornsoft delays launches

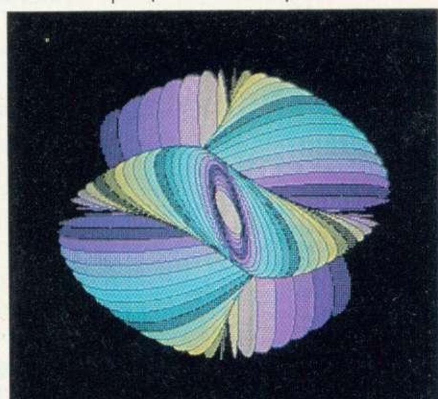
ELITE II and the Graphics Extension ROM will be on sale this month, says Acornsoft. The new *Elite* runs on the 6502 second processor and will cost £19.95, with the graphics ROM at £29.95.

Neither product was on sale as promised at the Acorn User Show, and rumours were rife that both had been delayed to coincide with the launch of a new BBC micro, but these have been discounted by Acornsoft.

The delay in the graphics ROM was put down to problems with printing the packs, while Acornsoft had still not made its mind up on how to release *Elite II*.

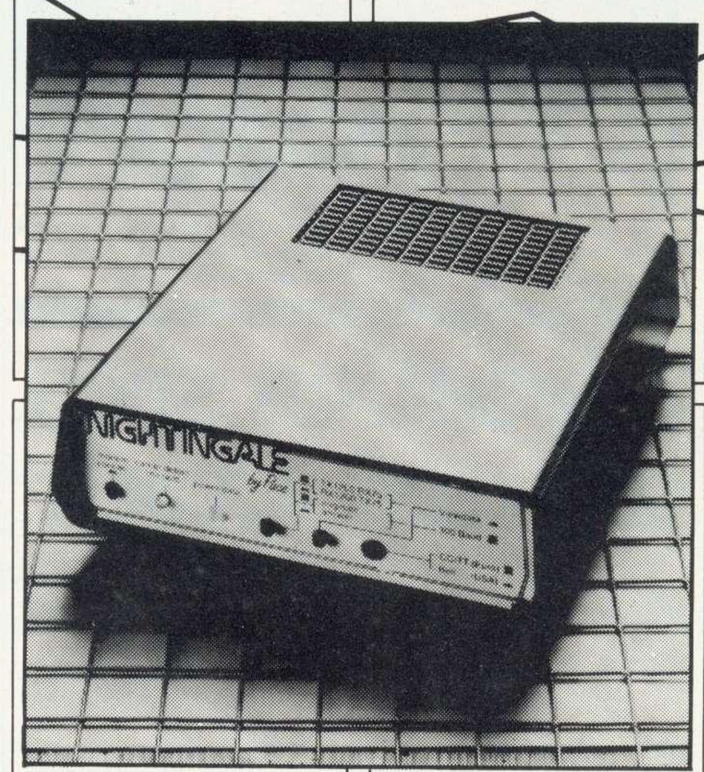
Meanwhile, Acornsoft has released the *Termulator* and *View 3* ROMs. *Termulator* sets the BBC micro up to mimic a mainframe computer terminal for communications and costs £34.50. *View 3* is the latest version of the popular wordprocessing chip.

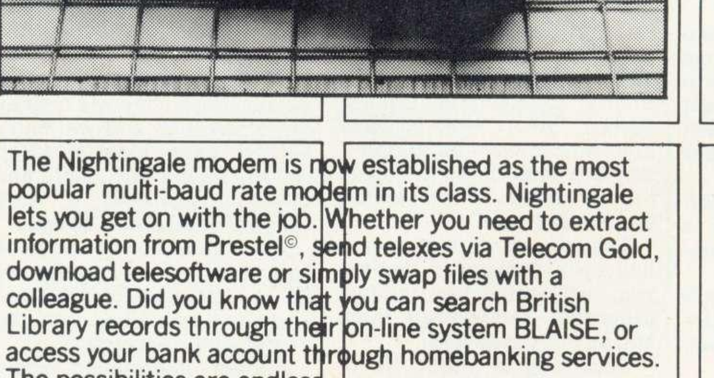
View 3 will work in shadow mode on the BBC+ – and it will automatically relocate onto a second processor. It comes complete with printer driver disc and costs £89. *Hi-view*, the disc-based second processor version, is to be discontinued.



Graphics Extension ROM: delayed







The Nightingale modem is now established as the most popular multi-baud rate modem in its class. Nightingale lets you get on with the job. Whether you need to extract information from Prestel©, send telexes via Telecom Gold, download telesoftware or simply swap files with a colleague. Did you know that you can search British Library records through their on-line system BLAISE, or access your bank account through homebanking services. The possibilities are endless.

Nightingale operates at the two most popular baud rates, 1200/75 as used by both private and public viewdata systems, and 300/300 baud for communication with remote mainframe, mini or micro systems. Also included is 'reverse viewdata mode', 75/1200 and an optional auto-answer/auto-dial board.

Approved for use in the UK and several other countries, Nightingale can be supplied with quality software for a variety of the most popular micros. If you own or use any micro with a standard RS232 interface, including the BBC micro, IBM PC, Apricot, Sirius or an Apple //e, //c or Macintosh, etc, then we may be able to help you.

With the increasing number of valuable information systems coming on-line, how much longer can you afford to be incommunicado?

Nightingale modem £119 plus VAT

Payment accepted by Cheque, Access or Visa.

Prestel is registered trademark of British Telecommunications Plc.

Pace Micro Technology, a division of Pace Software Supplies Ltd.





Top row KX1203, K12SV3, KX1201. Bottom row K12R3, K12R2. Optional 'tilt and swivel' stand shown with certain models.

Aim straight for a Taxan

When you're aiming for the best monitor around, set your sights on a Taxan.

Because Taxan are quite simply the biggest selling range of monochrome and colour monitors in Britain today.

And that's hardly surprising since every Taxan Monitor is designed and engineered for superb style and maximum performance.

Take a look at the KX1201 and KX1202 for example.

High quality, high resolution 12 inch monitors offering a choice of Green or Amber display with a long persistenceoption on the Green phosphor model.

With the latest non-glare flat tube for easier viewing and more than 20MHz video bandwidth, you can't do better than a Taxan monochrome monitor.

Taxan also produce a range of 12 inch RGB colour monitors that give you unbeatable price performance.

Like the medium resolution K12R2 (Vision II) and the high resolution K12R3 (Vision III).

Compact professional monitors, suitable for all popular micros. Built-in switchable RGB interface for added versatility and both suitable for 80-column text display.

Finally, the K12SV3 (Super Vision III). A 12 inch, RGB, super-high resolution, colour monitor with three different monochrome modes. Fully compatible with IBM PC, Apple, BBC and most other personal computers it is simply the most versatile monitor on the market today.

Taxan Monitors retail at around:

KX1201G	£109 (plus VAT)
KX1202G (P39 Phosphor)	£119 (plus VAT)
KX1203A	£119 (plus VAT)
K12R2	£285 (plus VAT)
K12R3	£399 (plus VAT)
K12SV3	£429 (plus VAT)

Ring us on Ascot (0990) 28921 for the name of your nearest dealer. And find out why you should aim straight for the best-selling range of monitors around.



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Tel: 0990 28921
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THE NEW FORCE IN DISTRIBUTION



Memory pack with power

THIS non-volatile 64k RAM module for the BBC micro or B+ from PMS costs £149.44 and can be used as either a 'silicon disc' or a printer buffer. It has its own battery, so you don't lose information on switch-off.

It comes with system software and utility programs.

Details on (03552) 32796.

Drum machine adds to Beeb's battery

A DRUM machine add-on for the BBC micro has been produced by Rice Computer Electronics.

The £45 unit can generate eight simultaneous drum voices including bass, snare, four tom-toms and two hi-hats. The drums are 'hit' by pressing keys on the keyboard and sound output is via a suitable audio amplifier.

It comes complete with software and is available from Rice Computer Electronics, PO Box 2, Morecambe LA4 4PP.

Hybrid Technology has released a 40-minute audio cassette of music produced using its Music 500 synthesiser add-on. *An Evening in the Company of the Music 500* includes pieces composed by Duran Duran, Scott Joplin and Haydn, and costs £1.95. It's the first of many planned releases on Hybrid's own label, 256-byte Records. Music for the synthesiser will also be available as programs in Ample, the Music 500 operating language.

Hybrid Technology, Unit 3, Robert Davies Court, Nuffield Road, Cambridge, OB4 1TP.

Also on a musical note, Electromusic Research has a range of musical hardware and software for the BBC micro. The MIDI interface allows a BBC micro to control a MIDI-equipped musical keyboard and costs £79.90.

Composer (£44.95) allows input and editing of tunes from the BBC micro. *Performer* simulates the control of a multitrack digital tape recorder, and can record all MIDI data onto disc, priced at £49.95. Editing of music files created by these programs is done by *Editor* (£34.95), while *Vu-Music* at £24.95 displays moving graphics on the Beeb's screen in response to music. Further details from Electromusic Research on (0702) 335747.

U2 utility ROM for second processors

A UTILITY ROM for Beebs fitted with 6502 or Z80 second processors has been produced by Kent Micro Computers.

The *U2* ROM's features include up to 28k of printer buffer, high speed data transfer across the Tube and easy saving of screen RAM.

Kent Micro Computers, 57 Union Street, Maidstone, Kent ME14 1ED.

Unit turns Beeb into a B+

RAMAMP Computers has developed a hardware plug-in which 'turns' a BBC micro into a B+.

The unit, imaginatively titled the RA20+44, costs £79 and offers 20k of video RAM (hardware switched) plus 44k of ordinary RAM.

The latter consists of 12k for printer buffers and the like, and 32k for running ROM-type software in.

Compatibility is claimed with all versions of *View* and other ROM-based software. *Wordwise* will not work with the video memory turned on – just like the B+.

Enquiries to Ramamp on (0533) 864966.

Acorn User Reader Services

AS a result of pressure from readers, *Acorn User* has decided to launch a guaranteed fast reply service for enquiries. Your answer will be returned within five working days for just £2 (includes VAT), or your money back.

The idea is simple. Just write out your problem, fill in the coupon below, and send both off to *Acorn User* with a stamped addressed envelope and cheque or postal order for £2. Make sure you include as much detail as possible and a disc or cassette if a program is involved – with enough space to record any corrected listing.

We will then answer the problem and return all material received – within a guaranteed *five working days* from receipt – in the sae. If we fail to match this promise your cheque or postal order will be returned with the answered question.

If we cannot answer the problem, the cheque will be sent back to you.

This service has been set up because so many readers want a fast answer, which we do not have the staff to provide. Under this new system, special technical staff will be available who can give the fast, guaranteed turnaround required.

Whether you want a listing debugged, advice on hardware or software, or a list of addresses, send your problems to Reader Services, Acorn User, 68 Long Acre, London WC2E 9JH.

ACORN USER READER SERVICE
68 Long Acre, London WC2E 9JH

Name ....

Address ....

....

....Post code ....

Daytime phone number ....

I enclose a cheque/postal order for £2 and an sae with my problem.

OFFICE USE ONLY Date in:
Date out:
Answered by:



Show success breeds another

THE success of the third Acorn User Exhibition has so astounded the computer trade that companies are clamouring for another show – to be held in November at London's Central Hall in Westminster.

More than 24,000 people flocked to the Barbican for the annual binge and queued to get in – one woman claimed for two hours – despite the rain.

A major lure for visitors was the number of bargains to be had. Viglen was selling 800k, 40/80 switchable disc drives for £180. Single 100k drives were going for £50 – almost as cheap as a cassette data recorder. Dealers were shifting games and software for as little as 50p.

New products launched included the Aries B32 memory board, a 64k battery-backed RAM pack, Miracle's WS3000 modem, several robots, multitasking Basic from CMS Soft, Solidisk 256k sideways RAM and products galore from companies such as Technomatic, Watford, etc.

Queues

The worst of the queues built up around Friday lunchtime, when the number of people inside the Barbican reached the safety limit.

The number of visitors surprised even the organiser Tim Collins. 'We had far more advance ticket sales than last year, but it was incredibly busy on the Thursday and Friday – and it didn't slow up at the weekend as expected.'

Tremendous

'Even before the show ended, exhibitors were coming up to me asking for another one at Christmas,' said Collins. 'With all the bad stories in the press and Acorn's problems it's no surprise that they want something like this. It's a tremendous confidence booster.'

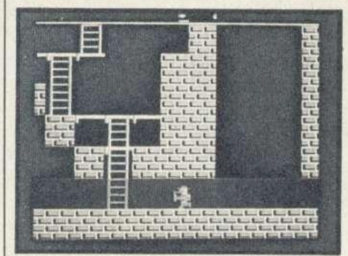
The Acorn User Christmas Show will be targeted at users who want to buy for themselves and friends or relatives. It will take place at Westminster Central Hall in London on Friday and Saturday, November 22-23. Tickets will be £2 for under-16s and £3 for adults.

Software houses go for quality not quantity

MICRO Power is to release a graphical adventure based on the Dr Who TV character.

Other software houses have announced their Christmas releases for the BBC micro and Electron, including Superior, Acornsoft and Incentive.

Superior has four titles on the way including a follow-up to the successful *Repton*. Acornsoft is updating *Revs* with more racetracks and has at least one other game in the pipeline. Incentive is launching BBC micro and Electron versions of its software, as is Ultimate.


Castle Quest: follow-up due

The major difference over last year is that most companies are releasing fewer titles and going for better quality. Also, successful companies in the Spectrum and Commodore market are doing BBC micro and Electron conversions. Ultimate's *Alien 8*, *Knightlore* and *Atic Atac* have done well, and Incentive is encouraged by the response to *Confuzion*.

Micro Power's game – the name is still secret – uses the techniques pioneered by *Castle Quest*. The Beeb version will come on disc or cassette plus 16k ROM chip!



Revs: more tracks planned

Alan Butcher of Micro Power said: 'It's a natural follow-on from *Castle Quest*, but the story is different'.

Micro Power has pulled off a major coup in getting a *Dr Who* licence, as until now the BBC has kept the character for its own software. BBC Publications has vetted the game.

The agreement takes in the Doctor, his arch enemy the Master, Tardis and some of the minor villains.

This game will only be the second from Micro Power this year, against 30 in 1984 – a deliberate policy – and a trend already seen at Acornsoft.

Butcher explained: 'The games will be dearer, but we are going for value for money. There were so many titles last year that even the best were swamped.'

Superior Software has four games on the way, headed by a *Repton* sequel with more monsters and hazards, lots of mazes and 'portals' between screens. A second title is *Death Star*, a 'sophisticated shoot-'em-up space game'. Another arcade adventure with 120 screens is under way for Christmas on the BBC micro and Electron.

Superior has fewer games coming out, but the reduction isn't as drastic as at Micro Power and Acornsoft. Chris Payne said: 'We've got four titles coming which all stretch the Beeb. We're not wasting our time with average games.

'There's also something special for Christmas. It's not a game but it is revolutionary.'

Acornsoft's Jeremy Preston sees *Elite* as hard to follow for anyone. 'Our efforts will be put into relaunching *Revs* with more tracks on a disc to link into the standard game. There will be another launch, but it won't sell in the same sort of numbers as *Elite*. 'We're going for more sales on fewer titles.'



Elite: 'hard to follow'

Incentive, who broke new ground with *Confuzion* conversion coming on the same tape for the BBC micro and Electron, has adapted its *Ket* text adventure trilogy as well as the *Moonquest* arcade game. Plans are afoot for disc versions of these and *Confuzion*, possibly with more than one game per disc.

Datanurse set to enter hospitals

TORCH Computers has developed a nursing administration system – *Datanurse* – to run on its BBC micro-based machines.

The system allows patients' details and personnel records to be kept, and budgeting.

A complete installed system costs upwards of £5,000 with further details from Torch on (0223) 841000.

GLORIOUS MUD

You've always wanted to wallow in MUD? Now's your chance!

MUD – Multi-User Dungeon – is a computer adventure game. You can play it by accessing a mainframe computer using your home micro and a modem. In one respect it's like many computer adventure games. You find yourself in a mysterious place ('The Land') which you must map out.

However, unlike 'normal' adventure games, which tend to seem somewhat stale after you've played them a lot and have solved all the puzzles, *MUD* is different every time you play it – because you're in competition not only with the program but also the other players on-line at the same time as you.

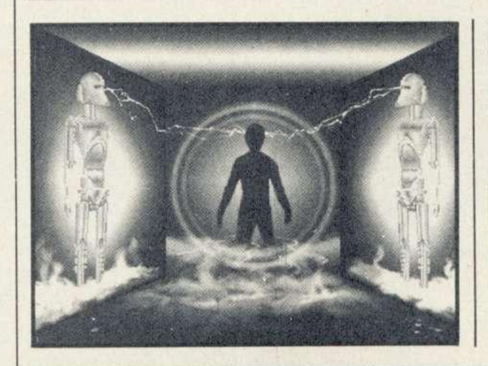
It's the social interactivity of *MUD* which makes it compulsive. You can chat to your fellow players, help them, attack them or steal their treasure. And they may be thousands of miles away!

MUD is a very hierarchical game. You begin life as a bewildered novice. As you accumulate points and treasure you find your powers increase, especially your ability to use magic. If you're good at the game, after many, many hours of play you might make it to the exalted rank of 'wizard' (or 'witch' if you're female). Now you find you've become immortal. No-one can kill you and you have a whole new set of commands at your disposal.

To become a *MUD* wiz is even more satisfying than making it to *Elite* in the popular Acornsoft game. So far about sixty people have managed it. Wizzes come in various shapes and sizes. The oldest is 42, the youngest 13.

All this has changed, however. The original authors, Richard Bartle and Roy Trubshaw, have formed a company with Simon Dally – MUSE (Multi-User Entertainment Ltd) – and completely rewritten *MUD* so that it's over twice the size of the original. The game is now available on a British Telecom Vax computer in London from 6.00 pm to 8.00 am on weekdays and all day bank holidays and weekends. Any micro with an RS232 port and a modem can access *MUD*. To join you purchase a starter pack for £20. This gives you your account and password, a booklet explaining the game and a map. Your first three hours on *MUD* are free, thereafter it costs £2 an hour plus the telephone charges (about 40p an hour at local rates).

There's always something new happening in *MUD*. Recently Frobozz the Wizard and Kate the Enchantress (in real life from Manchester and Liverpool) got married in *MUD*. An elaborate ceremony was staged in the Dwarfen Realm: considerable quantities of rum were consumed and some lusty singing took place. It's incidents like this that make people say, 'You haven't lived until you've died in *MUD*. . . .'





Acorn User's glorious MUD competition

This month's competition prize is a free *MUD* starter pack worth £20. Several computer magazines are running *MUD* competitions at the moment. The winners of each, apart from getting the starter pack, will receive some on-line tuition in how to play *MUD* by a *MUD* wiz. Then a *MUD* spectacular will be held for the winners at the London Dungeon on 5 November (in a spectacular, the object is to be the only character remaining alive at the end of the game) and the winner of this will receive £100 from British Telecom, the co-publishers of the game, and 1000 *MUD* credits giving approximately 166 hours of free game time. The competition for *Acorn User* readers is to solve the puzzles in the *MUD* mausoleum. The correct solution to each puzzle opens up one of the tombs – and enables you to get some treasure. The puzzles are changed roughly once a month: these are the ones being used in November.

1 KHS GDK CYF YSP ULA QOY ???
2 LAXATIVE = 2000
COMICAL = 5495000 CRUCIFIX = 90900
DELIVERY = 27000 SPECIFIC = 9999
MINIMUM = ?
3 11:30 07:45 02:30 06:30 02:35 07:45
11:50 11:50 02:30 03:45 06:30 06:35
03:30 11:50 02:30 06:45 06:30 00:30

Answers on a postcard, please, to arrive not later than 25 October 1985, to *MUD* competition, Acorn User, 68 Long Acre, London WC2E 9JH.

Please send me details about MUD and how to access it.

NAME ....

ADDRESS ....

....

....

Send this coupon or a photocopy to MUSE Ltd, 6 Albemarle Way, London EC1V 4JB.

On show

☐September 28, Micros in Weather Education, Chelsea College, London. Conference to discuss the usefulness of micros in weather education – plus hands-on experience of packages and systems. Cost £7.50. Further details from Royal Meteorological Society, James Glaisher House, Grenville Place, Bracknell, Berks.
☐October 16-18, Computer Graphics, Wembley, London. Details on 01-868 4466.
☐November 7–11, Hobby Elektronik, Stuttgart, W Germany. One for our German readers: a five-day exhibition mainly for the hobbyist with sections devoted to practical electronics and micros. Information on 01-236 0911.

On television

☐It's all change with the major stations' computer TV shows: BBC's *Micro Live* expands from a monthly to weekly show and it looks like ITV's *Datarama* could switch from going out once a week to monthly.

Micro Live returns to BBC2 at 7.30 pm every Friday, starting on October 11. The new weekly format promises a more up-to-date coverage of news from the computer world. For the first programme there's a look at speech chips for the BBC micro and a US report from Freff.

ITV's *Database* is off the air this autumn and producer Michael Feldman is keen to see it return in the spring on Channel Four and going out monthly; in the past *Database* has been transmitted weekly on the main ITV channel. The plan is to combine it with the *Database* team's other production, *Four Computer Buffs*, which caters for hobbyists, and produce a longer monthly programme.

The BBC Computer Literacy Project takes to the airwaves this autumn, with repeat showings of all its TV programmes during the daytime on BBC2. The oldest, *The Computer Programme*, dates from those halcyon days back in 1982 and some of its predictions seem rather optimistic and naive. Still, it's a useful primer for absolute beginners. *The Computer Programme* goes out at 12.05pm weekly from 27 September. The *Electronic Office* will be transmitted at 12.35pm weekly from the same date.

On radio

☐*Datarama*, the networked computer show for commercial stations, has been postponed. Tim Lyons, producer of the show, said there had been some difficulty finding suitable commercial sponsors: 'Companies with a direct interest in selling computers – Acorn for example – are not allowed to sponsor the show. We're trying to find someone on the periphery.'

Datarama was to have started in September but it's now unlikely to go out before the winter – and possibly not until the new year.

To contact

☐Technomatic's bulletin board service, containing information on products the company stocks, is open 24 hours on 01-450 9764. Baud rate: 1200/75.
☐Acorn's own dial-in viewdata service is on (0223) 243642. Baud rate is 1200/75.
☐Teachers interested in the Acorn Micros in Schools scheme can contact Acorn's education division on (0223) 245200.
☐BBC TV's *Micro Live* bulletin board is on 01-579 2288 (type INFO BBC on Telecom Gold electronic mail system).
☐BBC Computer Literacy Project, Broadcasting Support Services, PO Box 7, London W3 6XJ. Please send sae.
☐Bulletin Boards:
CABB 01-631 3076
CBBS Cumbria (06992) 314
CBBS London 01-399 2136
Distel 01-679 1888
Forum 80 Hull (0482) 859169
Forum 80 London 01-902 2546
HAM-NET (0482) 497150
Liverpool Mailbox 051-428 8924
Mailbox 80 (0384) 635336
Microweb 061-456 4157
TBBS London 01-348 9400
TBBS Nottingham (0602) 289783
TBBS Southampton (0703) 437200
☐MEP (Microelectronics Education Programme), Cheviot House, Coach Lane Campus, Newcastle-upon-Tyne NE7 7XA. Hardware and software support for schools. Please send sae.
☐MAPE (Micros and Primary Education), c/o Barry Holmes, St Helen's Primary School, Bluntisham, Cambs. User group for primary teachers. Please send sae.
☐MUSE (Micro Users in Schools and Education), Freepost, Bromsgrove, Worcs B62 7BR. User group for teachers and parents. Please send sae.
☐National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN. Educational and training courses on the BBC micro. Please send sae.

For help

☐Seikosha AP/GP100 printer help sheets are available from *Acorn User* for 50p, plus sae. These consist of three programs, including a screen dump, and three pages of notes on using these printers.
☐Monitor choice: Photocopies of the review of four monitors, plus a set of nine test programs from the June issue cost 72p (inc post). A copy of the issue costs £1.25 (page 93).
☐For *Acorn User* cassettes, discs, back issues, binders, contact PHS Mailings on (02937) 72208 (see page 96).

Blunderbox

☐TWO errors have crept into the 'PLOT2' listing from the *Easyplot* series, published in the August issue of *Acorn User*. Line 190 should contain a space in between the 'G' and the 'TO' in the phrase 'ELSEFORI=GT01' to avoid a 'no such variable' error. Also a '£' was printed instead of a '#' in the following lines: 160, 170, 180, 410, 420, 1190.
☐THERE are a couple of small errors in Peter Higginbotham's Beeb Forum article in the September issue.

In the article, the reference to address C800 three-quarters of the way down the second column on page 117, should be B800.

In the program, lines 480 and 620 have an LDA instruction where there should be LDX. This generates a non-existent OSBYTE call (A=&30) instead of the intended one to change the SHEILA paged ROM select register (OSBYTE A=&97, X=&30). It seems that this call is not actually necessary in the context of the program – the previous OSWORD call to write the ROM number to &F4 in page zero of the I/O processor is sufficient. However, for use as a general purpose routine, the LDX should be corrected to avoid problems.

How to present programs and articles

FIRST read the 'Notes for Authors' on the contents page.

Your submission should be original and have a practical use. We receive many articles on subjects we have already covered – often quite recently.

A neat and clear presentation is very important. A few hours' thought about how your article looks, diagrams, applications and documentation will ensure that it is evaluated quickly and efficiently, and is more likely to be accepted.

Program presentation is also important. Follow the 'standard' we've adopted in the yellow pages. Most importantly, your program must run on Basic 1. The only exception is if the program is of a Basic 2 tutorial nature. Basic and illegal calls to routines in the MOS should not be used. Program lines should increment in steps of 10, with the first four being REMed as per the format in the yellow pages.

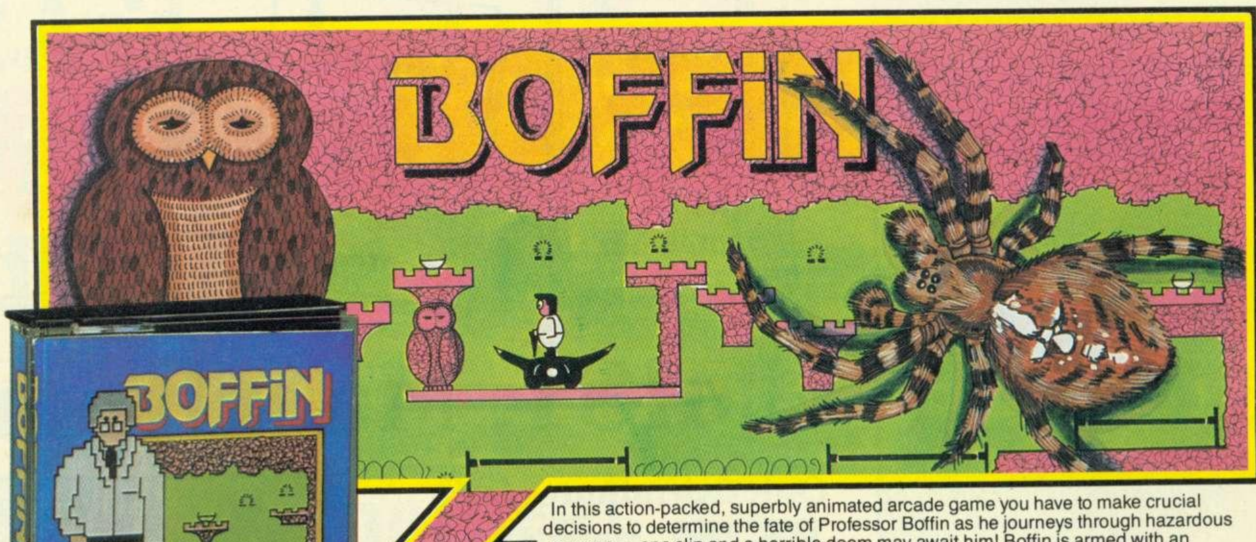
Program listings should not be indented, and avoid multi-statement lines.

Use the standard assembler presentation, one mnemonic per line, upper case mnemonics with lower case labels. If the assembler is long include a checksum.

Provide a list of PROCs, FN's and variables detailing the operation of each on a separate sheet of paper, along with any hints or tips regarding entering the program.

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In this action-packed, superbly animated arcade game you have to make crucial decisions to determine the fate of Professor Boffin as he journeys through hazardous caverns – one slip and a horrible doom may await him! Boffin is armed with an umbrella which he can put up to break a fall or a leap from a great height, and trampolines are to be found in certain of the caverns which help him to "bounce" his way to safety.

However, there is added danger as hideous creatures are lurking waiting for Boffin to stray too close to their fateful grasp!

Boffin is available for BBC 'B' and Electron priced £9.95.

ALSO AVAILABLE



STRINGER
Stringer is an arcade adventure game in which you are a press photographer set the task of snatching a shot of a Film Star in an hotel. The game is tantalisingly playable, graphically excellent and, of course – Addictive!
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*Delete as applicable
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....
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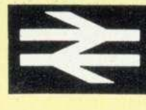






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To M61/M62 Junction 12 M6 North
To M56 Junction 3 M6 South
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Reduced prices for School/ College Groups

Entry only £1 per student if bookings are made in advance. Send your cheque (made payable to Database Publications) and SAE to:

Electron & BBC Micro User Show
68 Chester Road, Hazel Grove
Stockport SK7 5NY.
Tel: 061-480 7863

Valid for a minimum of 10 people

THEY'LL ALL BE THERE!

Come and meet the people whose names you see regularly in the news pages of this magazine – the people who've helped both the BBC Micro and Electron evolve into the truly versatile computers they are today. They'll all be there on their stands, willing to give you help and advice. So too will be our writers and programmers. They will also be delighted to talk to you and give you the benefit of their experience.

This voucher is worth 50p per head!

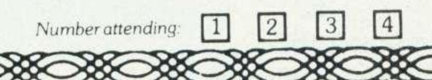
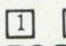


By handing in this voucher at the door you save 50p off the normal admission price of £2 (adults) and £1.50 (children).

(Valid for a maximum of 4 people)

10am-6pm, Friday, 27 September
10am-6pm, Saturday, 28 September
10am-4pm, Sunday, 29 September

Renold Building, UMIST, Manchester.

Number attending: 1 2 3 4 **AU/10**

New Computer Games For Solidisk Sideways RAM

SOLIDISK's SIDEWAYS RAM is an almost indispensible add-on for the BBC user.

It is available in either 32k, 64k or 128k byte capacity and is compatible with all issues of BBC microcomputers along with most of the add-ons and ROMs obtainable for it.

To date, more than 40,000 units have been sold.

The sideways RAM occupies the right most ROM socket of the BBC and sits in the same position in the micro's memory map as the paged ROMs.

This means that the Sideways RAM can run almost all ROM type software including languages, utilities and filing systems.

The difference between Sideways RAM and Sideways ROM is that RAM can be written to meaning that only the presently required software has to be loaded into the machine, thus making redundant the multitude of high current consumption and often unsightly ROM extension boards.

Sideways RAM is also an invaluable tool for writing ROM type software to run on the BBC since software may be assembled straight into the area in which the final version will run.

For the user who is not interested in writing ROM type software but is in need of the utilities provided by the use of the Sideways RAM, we supply free software to make maximum use of the Sideways RAM facilities.

These are included in the Sideways RAM Software package, a collection of no less than 5 diskettes containing nearly 100 programs, from database, word processor, music system, sprite graphic, printer buffer, virtual memory, spelling checker, RAM disk, RAM filing system, VDU replay, disassembler, machine code monitor, macro basic, video digitised pictures etc . . . and Solidsk Most Advanced Disk filing System version 2.0.

Another extremely interesting use is to run Solidisk 'Megagames'. They are too large for the non expanded BBC computer, as they make use of high resolution 8 colour (mode 2) screen, background music, sound and sprites at the same time.

PRICES

The listed price comprises the Sideways RAM fully guaranteed for 1 year, comprehensive manual and software pack 1 consisting of 5 diskettes formatted either in 40 or 80 track.

— SWR32 + 5 discs (32k unit, by far the most popular): £58.00
— SWR64 + 5 discs (64k unit, new introduction model): £85.00
— SWR128 + 5 discs (128k unit, the second most popular): £135.00
— Any Extra Software Pack (5 discs): £10.00. Specify 40 or 80 tracks.

As Solidisk Software Support Service has to produce in excess of 25,000 diskettes every month, we regret that we can no longer provide personalised service for disk washing. In extreme cases, when you need to update your software diskette, either reorder a new software package (which is always sold to you at nominal media cost i.e. £10.00 for 5 disks, including new manual, post and packing) or return the old package with £2.00 to cover post and packing. You may avoid post and packing costs if you call at Solidisk's stand at any BBC micro exhibition or at the Solidisk office.

UPGRADING

Upgrading from a smaller model is very simple: you return the old RAM board to us with your payment for the difference.

The listed prices include new manuals when necessary.

SOFTWARE PACK 1
(included with SWR)

The Software package comprises 5 diskettes, formatted either in 40 or 80 track. Please specify when ordering.

Volume 1:
Volume 1 contains all the general applications of Sideways RAM. Menu, Printer Buffer, STL DFS 2.0, STL E00, RAMDISK, RFS (Rom generator), Fast Backup.

Volume 2:
Volume 2 contains the Solidisk Wordprocessor, Spelling Checker and the English Dictionary.

Volume 3:
Volume 3 contains the Solidisk Macro Basic (a program generator), a Linker-Editor, VMP the Virtual Memory Program, Sigen, a program to create your own dictionary and a sample French dictionary.

Volume 4:
Volume 4 contains the Solidisk Database.

Volume 5:
Volume 5 contains the Solidisk Sprites System.

SOFTWARE PACK 2
(optional)

Volume 6:
Volume 6 contains the Solidisk Spreadsheet.
Menu driven with standard options to create, edit, recalculate, print, search, sort, report generator and mailmerge.
Unlimited number of rows and columns. Each column can be as small as 2 or as big as 70 characters. All math functions are supported. Complete with home banking and simple portfolio management.

Volume 7:
Volume 7 contains Solidisk Play Tunes System and lots of tunes and write music using ordinary ABCD notation.

Volume 8:
STL Toolkit has 24 star commands (Status, Rwipe, Check, Find, Search and Replace, Mode 8, Join, Keyload, LVAR, Salvage, Expand, Edit etc . . .).
STL SFX is Solidisk screen effects utility. In mode 2, you can scale, move, reverse, mirror etc with superlative ease.
VDURECORDER is another screen aid utility. It remembers everything sent to the screen. When you want it, *REPLAY will show it all over again but with an incredible speed.
Solimon is a machine code monitor for both 6502 and 65C02.

Volume 9:
Volume 9 contains the STL ADFS and disc utilities (see next page).

Volume 10:
Volume 10 contains the Solidisk Teletext Editor.

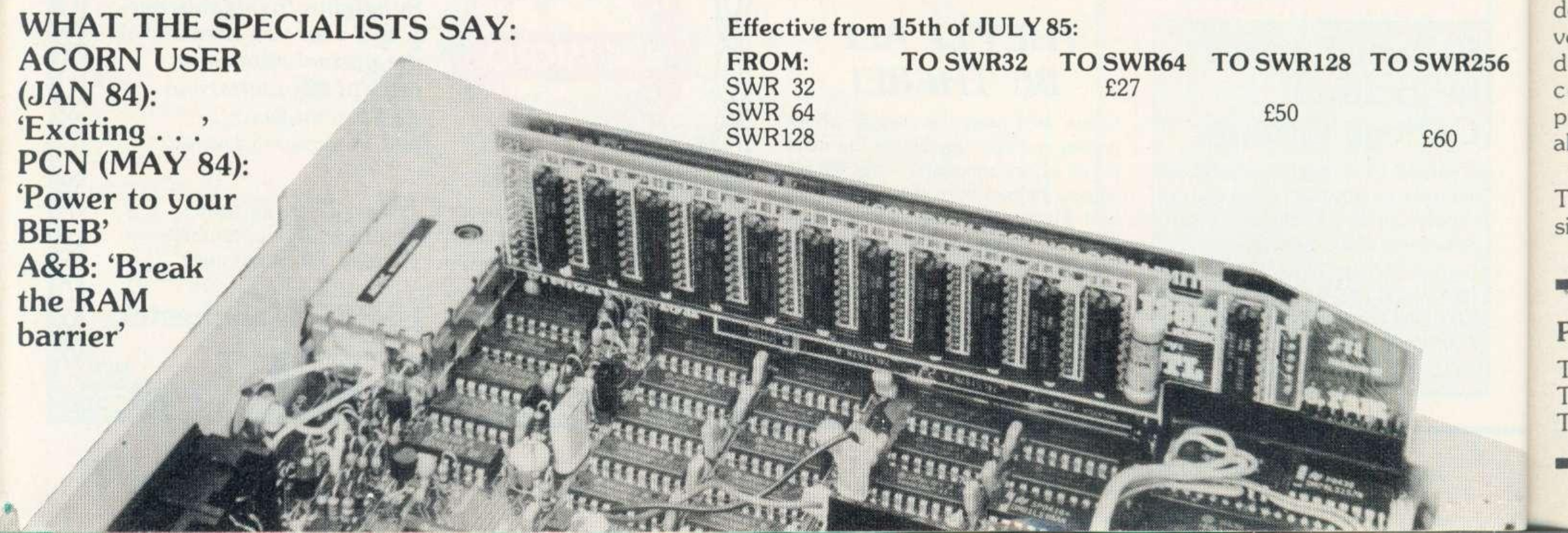
Megagame Packs:
Around 70 games are currently under compilation.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

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You Only Fit Disks Once. Fit the Best.

The SOLIDISK Double Density DFS is now the ultimate in reliability with a minimum component count and excellent software. The DDFS consists of only 4 components to be plugged in to the BBC Microcomputer and can be fitted in just a few minutes by novice and expert alike. It can now run all Acornsoft games (such as Elite, Aviator, Revs, Magic Mushrooms etc. . .) and most other protected discs (Castle Quest, Island's Music system etc. . .)

SOLIDISK relies on a good product and a large support network to win the heart of the user.

With over 75 local experts, covering England, Scotland and Wales, a SOLIDISK National User Group in Holland and soon in Australia, SOLIDISK can offer many users regional free fitting and advice. Also with an ever increasing catalogue of free software, available to all SOLIDISK users.

Even users who are new to the Disc System can expect to build up a large disc program library in a fairly short time.

Solidisk Software Support Service now has a responsibility for over 50,000 users and the ability to give you the best possible support matched only by the largest companies.

WHICH DFS DO YOU NEED?

SOLIDISK produce no less than three types of Disc Filing Systems to cover all your requirements.

1. THE FLEXIBLE DDFS

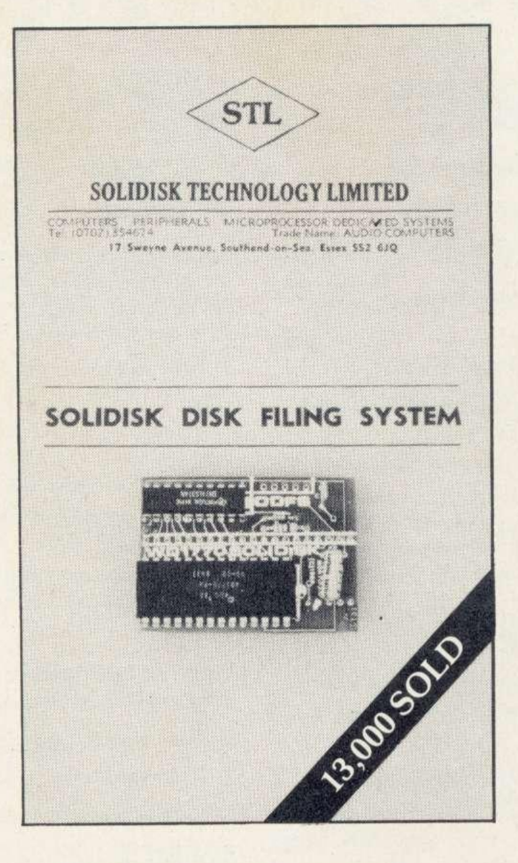
The basic SOLIDISK DDFS is suitable for all ordinary users.

The 1.9 ROM handles both single and double density formats, with built in disc formatter and verifier, along with such features as automatic density sensing and 40/80 track software controlled switching. The disc speed is programmable by the keyboard links to suit almost any type of disc drive.

The 1.9 ROM supports also file size up to disc size.

PRICE

The STL DDFS with 1.9 ROM £40.00
The STL DDFS with 2.0 ROM £45.00
The STL DDFS with 2.1 ADFS £55.00



2. THE DFDC TO UPGRADE ACORD DFS:

Ideally suitable if you already have an Acorn DFS. The DFDC will not only add Double Density capability but also improve the speed of your 8271 chip.

The SOLIDISC DFDC (Dual Floppy Disc Controllers) is making a very large impact on the BBC user community with its versatility.

The DFDC board simply sits in the place of the 8271 FDC chip (i.c. 78) in the BBC. The 8271 is then inserted into the DFDC board and the ROM 2.0 inserted in place of the original DFS ROM.

Once the machine is up and running it is then simplicity itself to change FDC's; just throw the switch attached to the DFDC board, press BREAK and the other FDC is now selected.

PRICE

The STL DFDC with 2.0 ROM £55.00
The STL DFDC with 2.1 ADFS £65.00

THE SOLIDISK WINCHESTER DISC SYSTEM (XD20-40)

This most powerful Winchester system for the BBC computer to date plugs straight into the 1Mhz bus in a few seconds.

Based around the WD1002 SHD controller, Mitsubishi Winchester drive, Astec PSU and the Solidisk ADFS 2.1, it offers 20 Megabytes (26 MB unformatted) and can easily be upgraded to a theoretical maximum of 1300 Gigabytes.

Its phenomenal capacity, huge potential and excellent features make the most expensive Winchester systems look green.

On the technical side, it has very fast seek and an exceptionally low skew factor of 11 (meaning 3 sectors are read or written in one single revolution). It gets ready very quickly too, needing only a few seconds from power up.

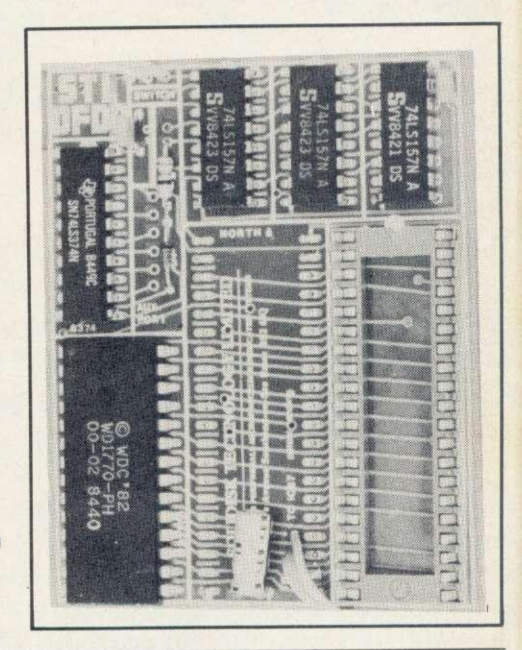
Unlike many other sources of Winchester disc drives, Solidisk Winchester system is properly driven by the Solidisk ADFS 2.1 ROM, compatible with Acorn Winchester specifications and with Acornsoft View, Viewsheet and Viewstore database.

It also runs Gemini's Datagem and Acorn second processors.

It has nice features such as read after write, Password protection, Automatic Winchester to Winchester and Winchester to floppies Backup facilities and a fantastic average file transfer speed of 64k bytes per second.

PRICE:

20 MB Winchester (excluding VAT) £700.00
30 MB Winchester (excluding VAT) £900.00
40 MB Winchester (excluding VAT) ..£1100.00
60 MB Winchester (excluding VAT) ..£1300.00



SOLIDISK TECHNOLOGY LIMITED
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TEL. SOUTHEND (0702) 354674 (10 lines)

YOU SHOULD KNOW ABOUT ADFS AND USE IT

ANNOUNCING THE SOLIDISK ADFS 2.1

What is important on a Disc Filing System is how effectively it uses the disc, how fast it loads the programs, how many entries are on the disc and how big they are.

The old BBC DFS leaves most 80 track discs half empty on side 0 and wastes side 2 of most double sided discs.

The new ADFS treats side 0 and side two (if available) as a single disc and uses them to the full.

The old BBC DFS uses single density, the ADFS double density which is twice as fast and stores twice as much.

The old BBC DFS can only handle 31 files of less than 256k bytes in size.

The ADFS can handle thousands of files, up to 600 Gigabytes in size!

If you are afraid that the ADFS is complicated to learn, don't be put off. It isn't complicated at all.

Most of the commands are the same in both systems and the ADFS ones are very much intuitive.

If you know the BBC DFS, a few hours are all you need to master the new ADFS.

You won't regret it. After all, each ADFS disc saves you £2.00 or more on media cost, and the ADFS ROM will pay for itself in a few days.

The Solidisk Advanced Disk Filing System for the BBC computer is now available for both Solidisk DFS and Acorn BBC Plus users.

This massive piece of software is supplied on two 16k ROMs for the BBC B computers or on a 32k ROM for the BBC Plus computers. It supports both the old BBC DFS and the Acorn ADFS. It also provides the users with 20 extra disc utilities.

Standard features for both implementations include:

1) Automatic Write Error Correction.
Every disk write operation is automatically followed by a read operation to ensure that the recorded data is free of all errors. Then if need be, the STL ADFS 2.1 will restart the write operation from the unsafe sector.

2) Automatic 40/80 track stepping.
The STL ADFS will let you read and write 40 track discs on an 80 track drive and copy over from any format to any other format.

3) Disc repair facilities.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER), rewrite multiple sectors (*RESTORE), read bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK).

4) Wordprocessing facilities.
This facility allows !BOOT and other text files to be edited, saved and printed in any screen mode.

5) automatic disc sensing.
On Shift Break, the STL ADFS will automatically detect the disc format and use the right disc filing system to run it.

Special features for the ADFS implementation:

1) Disc formatting facilities.
*FORM40, *FORM80, *FORM160 and *WFORM (for the Winchester) allow you to format ADFS discs in any drive.

2) Disc verifying facilities.
*VERIFY will check all disc sizes including Winchester for media defects.

3) Number of opened channels.
This is one of the star features of Solidisk ADFS.

This facility (*OPEN) allows you to specify how many files will be opened in a program, thus maximising the available RAM while avoiding buffer page swapping as in the Acorn ADFS.

It leaves PAGE at &1900 for most programs, gives extra memory to View and Viewsheet and also avoids unnecessary conversion work on programs originated for the BBC DFS.

Special features for the BBC DFS implementation.

Solidisk ADFS 2.1 handles both single and double density. In addition, it supports:

1) Unlimited catalogue entries (up to disc capacity) without any preparation.

2) Unlimited filesize.

3) Automatic media detection.

8) PRICE

2.1 ROM set	£20.00
Upgrade from 1.9	£15.00
Upgrade from 2.0	£10.00

SOLIDISK KEYBOARD AND CPU

ARE NOT JUST PRETTY . . .

The keyboard is 12 mm lower than the normal BBC case, 2-3 degrees more angled, weighs only 5lbs, does not skid about on the desk while enjoying 2 feet of freedom from the computer unit — and makes a lot of difference to typists (even 2 fingered ones!).

The CPU accommodates 2 disk drives and withstands any heavy weight monitor while providing easy attachment for the whole system, CPU and disk drives, to the desk if need be. Good ventilation to the power supply too and hides all untidy cables away.



PRICE

The complete CPU and keyboard case costs £30.000 inclusive + £3.00 post and packing. The system could be yours free as part of the Mitsubishi twin discs offer.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

SOLIDISK MITSUBISHI DISC OFFER

A Complete Disc System containing everything you need, including 1 Blank Diskette, at a new low price of only £199.00 inclusive.

The Mitsubishi Offer Comprises:

— One Mitsubishi MF4853, Double Sided, 80 Track Disc Drive. Cased in beige with all leads.
— One Solidisk DDFS complete Disc Upgrade with 2.0 ROM.
— 1 Verbatim MD525 Blank Diskette.
— 1 Software Pack and User Manuals.
— Full one year guarantee.

PRICE: 200.00.

HARDWARE:
As described earlier as shown opposite.

THE SOFTWARE:
The software comprises 5 diskettes, formatted in 80 tracks.

Volume 1:
Solidisk Word Processor and Spelling checker with English dictionary. Easier than View, Wordwise or Scribe, you enter the WP by *WP filename , then start typing. What you see on the screen will be exactly printed on paper.
Most useful commands are all displayed on the top part of the screen.
It features 80 column screen throughout with direct on screen justification, automatic margins, page numbering, Wordstar like editing commands for block move, block delete, block copy, print, save, load text to cursor, insert and overwrite, search and replace, total word count, word frequency count, free space, *commands etc. Solidisk WP loads and saves texts in under 1 second flat and also you may save the edited version as many times and under any filename you like.

It has the unusual ability to spellcheck your document without leaving it, simply by typing in Control-U.

It has self dictionary generating capability too. You may create any dictionary you like by just simply entering the words.



Solidisk WP is also excellent as secretarial training for Wordstar.

Volume 2:
Volume 2 contains Solidisk Database. It is a random access system, completely menu driven and easily customised to suit any particular filing need.

It features unlimited filesize and number of records, supports all maths functions and 80 column screen throughout.

It is simple to understand and to use. You take one of the 15 different options to start. Each option will then lead to a new menu and so on. Mostly you only have to enter an appropriate data or hit the RETURN key.

You can design new databases list all records, edit them, merge them, split them, making mailshot with Solidisk WP etc. . . We use it to process all your orders.

Volume 3:
Volume 3 contains Solidisk Spreadsheet. Menu driven with standard options to create, edit, recalculate, print, search, sort, report generator and mailmerge.
Unlimited number of rows and columns. Each column can be as small as 2 or as big as 70 characters. All math functions are supported. Complete with home banking and simple portfolio management.

Volume 4:
Volume 4 contains the Solidisk tape to disc program and a selection of computer games.

Volume 5:
Volume 5 contains MBASIC, SIGEN and other disc utilities.

IMPORTANT:

If you upgrade to a twin Mitsubishi disc system, Solidisk will offer you, subject to stock availability, a completely free set of CPU and keyboard case as shown earlier.

You should return your disc drive with payment for another Mitsubishi MF4853 (£160.00) or alternatively, save by ordering right now a Fantastic Offer at only £340.00.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

SOLIDISK EFS COMBINES DISCU
AND A SOCKET FOR THE WI

Solidisk Double Density DFS is now the ultimate in reliability and supported by the largest amount of software available for the Electron.
Solidisk relies on a good product and a large support network to win the heart of the user.
With over 75 Local Experts, covering England, Scotland and Wales, Solidisk can offer many users regional free fitting and advice.
With an ever increasing catalogue of free software, even users who are new to the Disc system can expect to build up a large library in a fairly short time.
Solidisk Software Support Service already has responsibility for over 50,000 BBC computer users and the ability to give you the best service matched only by the largest companies.
Solidisk Double Density DFS handles both BBC Discs and Electron Discs, in single and double density whereas the Acorn's PLUS 3 can only handle ADFS discs.
Solidisk ADFS has nice features such as automatic disc format sensing, built-in disc formatter and verifier and programmable disc speed.
It also has more than 20 disc utilities built into the ROM.
Standard features for both BBC DFS and ELECTRON ADFS implementations include:

1) Automatic Write Error Correction.
2) Automatic 40/80 track stepping, the ADFS 2.1 will let you read and write 40 trak discs if you have an 80 track drive.
3) Disc repair facilities.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER) rewrite multiple sectors (*RESTORE), read bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC discs.
4) Wordprocessing facilities.
This facility allows *BOOT and other text files to be edited, saved and printed in any screen mode.
5) Automatic disc format sensing.
On Shift-Break, the STL ADFS 2.1 will detect the disc format and use the right BBC DFS or Electron ADFS to run.

On the Electron ADFS side, the 2.1 ROM also has some very nice features:

1) Extensive Disc formatting facilities.
*FORM40, *FORM80, *FORM160 and *WFORM (for the Winchester) are available to handle any disc drive.
2) Disc verifying facilities.
*VERIFIFY will check all disc sizes including Winchester for media defects.
3) Number of opened channels.

This is the star feature of Solidisk ADFS.
This facility (*OPEN) allows you to specify how many files will be opened in a program, thus maximising the available RAM while avoiding buffer page swapping as on the Acorn ADFS.
It leaves PAGE at &1900 for most programs, gives more room to View and Viewsheet and avoids unnecessary conversion work for many programs originated for the BBC DFS to be run on your Electron.
On the BBC DFS side, the STL ADFS 2.1 handles both single and double density and in addition, it supports:

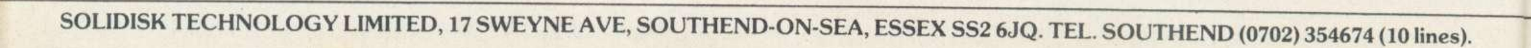
1) Unlimited catalogue entries.
2) Unlimited filesize.

THE SOLIDISK 16k SIDEWAYS RAM:

Solidisk Sideways RAM is an almost indispensible add-on for the Electron with disc drives.
The Sideways RAM occupies the same memory area as the BASIC or ADFS ROM in the micro's memory map. This means that Sideways RAM can run almost any ROM type software, including languages, utilities and games.
Sideways RAM is notably invaluable to run games and specially "MEGAGAMES".
Games and programs run at 2MHz clock speed in Sideways RAM, if loaded into the Electron RAM, they can only run at 1MHz clock speed, ie half the speed of Sideways based games.
Megagames are too large to be run on the unexpanded Electron. They use extensively 8 colour high resolution screen (mode 2), background music, sound and high speed sprites.
Solidisk supply free software to maximise the use of Sideways RAM on the Electron. These include Wordprocessor, Spreadsheet, Database, Toolkit, Machine Code Monitor, Printer Buffer, Sprites, Playtunes, Virtual Memory Processor, VDU Replay, Screen Effects, digitised pictures etc . . .

THE WINCHESTER SOCKET:

Solidisk has the most powerful Winchester system for the BBC computers and the Electron. The Winchester system can provide from 20 Megabytes to a theoretically possible 1300 Gigabytes of storage, directly on line with the Electron.
The same Winchester unit can be used on the BBC B, the BBC PLUS and the Electron without any change.
You can read more about it in BBC Micro User or in Acorn User Magazines. Price of a 20 Megabytes system is only £700.00 + VAT (£805.00).



UPGRADE, 16K SIDEWAYS RAM
NCHESTER FOR ONLY £59.00

SOLIDISK SPECIAL MITSUBISHI DISC OFFER:

This offer comprises:
— One 80 track Double Sided (640 kbytes) 3.5″ Mitsubishi disc drive with its own PSU. Cased in beige.
— Solidisk EFS Disc Upgrade, 16K Sideways RAM and Winchester socket.
— One software package containing four 3.5″ discs, detailed below.
— Full one year guarantee and 2 manuals.

PRICE: £200.00

You can also order as many Megagame Packs at the same time as you like. Each Megagame Pack consists of three 3.5″ discs and contains on average 20 games.

THE SOFTWARE:

The software contains everything to start a library: the big four (Database, Wordprocessor, Spreadsheet and Graphic), Utilities and Games.

Database:

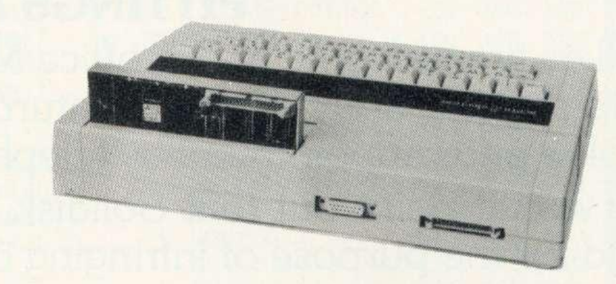
Solidisk Database is very easy to understand and use. You are presented with a 15 option Menu. Each option will lead to a new Menu and so on. Mode 3, 80 column screen is used throughout so that what you see is what will be printed on paper. With Solidisk Database, you can create as many records as you like, each record can be up to 15 fields of up to 60 characters. You can sort, search, index, mailmerge, append, create subset, calculate etc. Solidisk use the same Database to process all your orders.

Wordprocessor:

Solidisk Wordprocessor is WYSIWYG type (What You See Is What You Get) and has all the commands of a professional tool. It features 80 column screen, on screen justification, page numbering, search and replace, word count, free space, Wordstar like editing commands: insert and overwrite, block mark, move, copy, delete, save, load to cursor, * commands etc . .

Spreadsheet:

Solidisk Spreadsheet is also Menu driven and has the same file structure as Solidisk Database. You can have as many rows and columns as you like, each column can be as small as two characters wide or as big as 70 characters. All maths functions are



supported. Recalculate, Replicate, Print, Print If, Sort, Search, Define Zone, Mailmerge, Text Input/Output etc . . . are included.

Toolkit:

Solidisk Toolkit is almost indispensible for Electron programmers, it has 24 star commands (Status, Rwipe, LVAR, Move, Search and Replace, Expand, Salvage, Keyload etc . . .).

ORDER FORM

PRICE LIST and ORDER FORM.	Price	P&P
Diskettes.		
Verbatim 3.5″ box of 10	£40.00	£1.00
Software Pack	£10.00	£1.00
Solidisk EFS	£59.00	£1.00
Disc Offers.		
640k Mitsubishi MF453 Disc Outfit	£200.00	£3.00
1.3 MB Fantastic Offer	£310.00	£3.00
20 MB Winchester system	£805.00	£10.00
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Address: ______________________

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You can also order by phone 0702-354 674 9AM-5.30PM

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SOLIDISK LOCAL EXPERTS

To add further to the STL support service, Solidisk provide you with a nationwide network of more than 70 local experts.

These people do not sell our equipment but can generally install and check it at absolutely no charge. Once you have our equipment, ring us for the name and number of your nearest local expert.

FITTINGS AND CALLERS

Callers are welcome at our office Mondays to Fridays 9.30 to 5.00. Please note that we are closed on Saturdays. Customers requiring fittings must book a prior appointment by telephone.

We would point out that Solidisk, hardware and software should not be used for the purpose of infringing copyright.

Short form price list.

Qty Items.	Prices	P&P
For the BBC B:		
Sideways RAMs:		
SWR32	£58.00	£1.00
SWR64	£85.00	£1.00
SWR128	£135.00	£1.00
CPU & Keyboard Case (both)	£30.00	£3.00
Solidisk DDFS.		
DDFS (with 1.9 ROM)	£40.00	£1.00
DDFS (with 2.0 ROM)	£45.00	£1.00
DDFS (with 2.1 ROM)	£55.00	£1.00
DFDC (with 2.0 ROM)	£55.00	£1.00
DFDC (with 2.1 ROM)	£65.00	£1.00
Special Offers.		
640k Disc Offer	£200.00	£3.00
1.3MB Fantastic Offer	£340.00	£5.00
20MB Winchester	£805.00	£12.00
30MB Winchester	£1035.00	£12.00
40MB Winchester	£1265.00	£12.00
60MB Winchester	£1495.00	£12.00
For the BBC PLUS:		
SWR16+	£58.00	£1.00
SWR64+	£85.00	£1.00
SWR128+	£135.00	£1.00
SWR256+	£190.00	£1.00
640k Disc Offer	£200.00	£3.00
1.3MB Fantastic Offer	£340.00	£5.00
Winchester Units same as above.		
For the ELECTRON:		
EFS	£59.00	£1.00
Special Disc Offer	£200.00	£3.00
Winchester Units same as above.		
Eprom Equipment		
Programmer	£20.00	£1.00
Eraser	£20.00	£1.00
2764 × 5 new low price	£24.00	£1.00
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Misc.		
65C02 with Software	£13.00	£1.00
Solimon-2 16k ROM	£13.00	£1.00
2.0 DFS 16k ROM	£15.00	£1.00
2.1 ADFS 32k ROM	£20.00	£1.00

Total =

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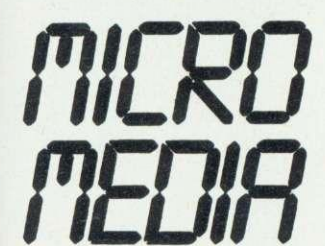
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SS/DD 48 TPI 40 Track	13.96	13.48	12.30
DS/DD 48 TPI 40 Track	18.96	18.22	16.57
SS/DD 96 TPI 80 Track	21.65	20.78	18.57
DS/DD 96 TPI 80 Track	24.87	24.00	21.43
DS HD 1.6 MB 96 TPI	44.83	41.93	39.11
VERBATIM DATALIFE			
SS/DD 48 TPI 40 Track	16.40	15.29	14.28
DS/DD 48 TPI 40 Track	21.30	19.95	18.70
SS/DD 96 TPI 80 Track	21.75	20.60	19.35
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SS/DD 135 TPI	28.60	26.50	24.80
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DS/DD	41.50	39.00	37.00
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ABA LOCK LID 5¼ x 90	18.30	17.10	16.45

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	70gsm	500	6.15	5.29	4.80
	90gsm	1000	12.70	11.70	10.08
	90gsm	500	7.65	6.57	6.05

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CANON PW 1156A/1080	5.95	5.45	5.05
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4023/1526 Fabric	4.75	4.30	4.00
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MPS 801/802	4.30	3.90	3.60
C. ITOH 8510/8510A	4.00	3.65	3.35
8600	9.70	8.95	8.30
DAISYSTEP 2000 Multi-Strike	3.45	3.15	2.90
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6300 Fabric	3.55	3.20	3.00
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KAGA KP 810/910	5.95	5.45	5.05
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OKI MICROLINE 80/82/83	1.80	1.60	1.50
QUENDATA 2000 Multi-Strike	3.45	3.15	2.90
2000 Fabric	5.45	5.05	4.70
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SEIKOSHA GP 80	3.45	3.15	2.90
GP 100/250	3.75	3.40	3.15
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SHINWA CP 80 Multi-Strike	4.60	4.20	3.85
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MD400B	MD200B
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3½" VERTICALLY STACKED DRIVES AT LOW, LOW COST WITH 1 YEAR WARRANTY

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★ Mains outputs, rated at 2.5A, 625W, optically isolated and zero voltage switched.
★ 4 Relays to switch DC loads, rated at 3A, 28V DC, SPC0.
★ 2 DC outputs which can be used for rapid switching, rated at 5A, 50V, 50W max.
★ 2 × 8 LED displays to monitor the user port and output devices.
★ Mains powered, regulated 5 and 12V supplies available to the user.
★ Many input and output modules available. Further modules soon to be released.
★ Demonstration software including a teaching program supplied on cassette or disc. All connecting leads and user manual supplied.
PortCom in rigid plastic case..£126.50
PortCom in metal case..£143.75

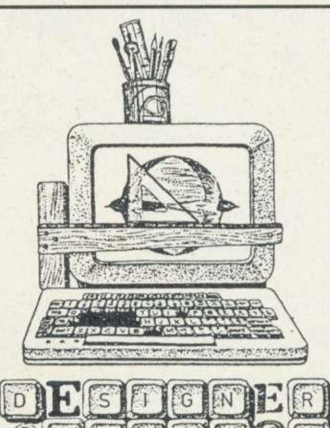
1MHz BUS TO USER PORT ADAPTOR
Not enough user ports? Then you need this adaptor. Generates 2 more user ports from the 1MHz bus. Jumper links inside the unit allow the user to select the address of the ports. Mains powered. Complete with user manual.
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Units to generate from 2 to 32 additional user ports available. Please write for details.

USER PORT MONITOR
A compact unit which allows the user to experiment with the user port. 10 LED display shows the status of all 8 data lines and both control lines. Connection to the monitor is either via a standard 20 way IDC lead or via 10 × 4mm jack sockets. Complete with user manual.
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BBC – ZX PRINTER INTERFACE
Still available, this popular product allows a ZX Printer to be used by the BBC Micro for listings, program development etc. Complete with user manual and fully relocatable machine code printer driver software.
BBC – ZX Printer interface..£29.95

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We can design and manufacture interfaces to customers own specifications whether it be for 1 or 100. Please write or phone giving details and we will quote for your requirement. Many satisfied customers.
Thermocouple temperature sensor – connects to the analog port of the BBC Micro. Including probe, user manual and software........£69.00
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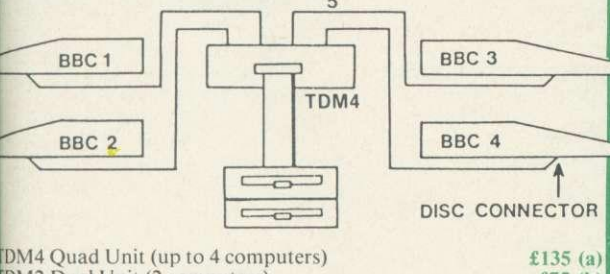
BBC Leads Kaga RGB £5(d) Microvitec £3.50 (d)
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Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software. £260 (b)

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TDM4 Quad Unit (up to 4 computers)	£135 (a)
TDM2 Dual Unit (2 computers)	£75 (b)

DISC ACCESSORIES

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10 Disc Library Case £1.80 (d) 30 Disc Case £6.00 (c)
Lockable Storage Boxes 40 Discs £14 (c) 100 Discs £16 (c)

DISC DRIVES

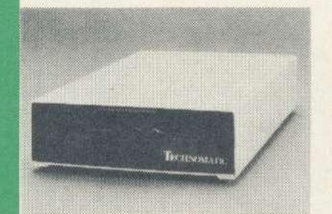
TECHNOMATIC drives are fitted with high quality slimline Mitsubishi mechanisms and represent the state of the art in drive technology. The drives are built to the highest standards and are tested to their full performance capability before packaging.

Single drives are available with or without integral mains power supply. The dual drive power supplies are switch mode type and are generously rated to ensure minimum heat generation even over long periods of operation. All drives with integral power supply are fitted with a mains indicator.

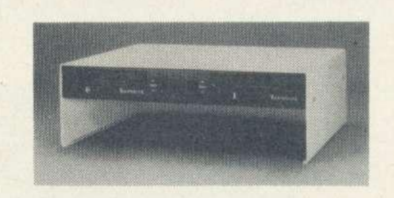
The drives are housed in attractively designed metal casings painted in hard wearing BBC matching paint. The dual drives can be supplied in stacked version or with built-in plinths. The plinth version cases are of sturdy construction to carry any monitor and provide a simple method of having a compact computer installation.

The 80T drives are supplied with the 40/80 track switching modules at no extra charge. The 40/80 track switches are conveniently positioned in the front on dual drives to enable easy switching between the tracks.

All drives are supplied with all the necessary cables, manual and a formatting disc. The mains powered drives are also fitted with a 13A mains plug suitably fused. The drives are ready to be fitted to the computer. All drives are capable of operating in single or double density modes.







Single Drives:			**With integral psu:**	
1 × 100K 40T SS	: TS100	£85(b)	PS100	£120 (b)
1 × 400K 80/40T DS	: TS400	£125 (b)	PS400	£145 (b)

Dual Drives: (with integral psu)

Stacked Versions:		Plinth Versions:	
PD200 2 × 100K 40T SS	£190 (a)	PD200P	£215 (a)
PD800 2 × 400K 80/40T DS	£265 (a)	PD800P	£289 (a)

Note: We can supply drives with Shugart mechanisms at considerably lower prices. Please phone for details.

3.5" Drives:
These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives come complete with cables, manual and formatting disc.

TS35 1 × 400K 80T DS £99 (b) TD35 2 × 400K 80T DS £175 (b)

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COMMUNICATIONS

MODEMS

BUZZ BOX A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as intercomputer communications. It conforms to CCITT V21 300/300 Baud Standard. Battery/mains powered **£62 (c)** BBC Lead **£6** External PSU **£9 (c)**

MINOR MIRACLES WS2000 A world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. WS2000 **£129 (c)** BBC Serial Cable **£7.**

Free Micro-Link registration and free Micronet quarterly.

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line **£30 (d).**
BBC User Port cable (for modem control) **£7.**

SKI KIT (Allowing total control of the modem by your computer) **£10.**

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols or autodialling **£10.**

WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£25 (d)**

NEW WS3000 SERIES A new range of microprocessor based modems, offering speeds of up to 2400 baud full duplex. Features include: 'Hayes' protocol compatability, Auto-Answer, Auto-Dial, speed buffering, printer port, data security option, etc.

WS3000 V2123 (V21 & V23) **£295 (a)**

WS3000 V22 (as above plus 1200 baud full duplex) **£495 (a)**

WS3000 V22bis2400 (as above plus 2400 baud full duplex) **£650 (a)**



COMMSTAR An ideal communications Rom. Extremely easy to use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. Any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time clock. **£27 (d)**

TERM-II A good general purpose communications package for bulletin boards, electronic mail etc. (Not for PRESTEL) **£26 (d)**

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£57 (d)**

REAL-TIME CLOCK CALENDER

We have broken the price barrier! A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as Extensive software on cassette (easily transferred to disc) — no ROMs needed. **£29 (c)**



EPROMER II



A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

* Integral power supply ensures no power drain from the computer.
* Interfaces through 1 MHz bus, fully buffered.
* Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
* Eproms upto 16K (27128) programmed in single pass.
* Selectable programming voltage 25/21/12.5V
* Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
* User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
* Full screen editor with HEX/ASCII input.
* Full tape/disc filing facility. Data input from keyboard/Tape/Disc/Eprom.
* Constant display of all options selected.
* Several BBC BASIC programs can be entered on a single eprom.
* Checksum facility allows for easy identification of programmed roms.

EPROMER II with Manual & Cassette **£99 (b)** Software on disc **£3**
ROM based software **£10**

UV ERASERS

UVT1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59 (b)**

UV1B as above but without the timer. **£47 (b)**

ROM/RAM EXPANSION SYSTEMS

COMPUTER VILLAGE ROM/RAM BOARD: A beautifully designed expansion board, simply plugs in — no soldering. (Fits into 6502 and Video ULA Skt.). Fully buffered with 16 paged Rom capacity. Option of 16K paged Ram, with software initiated write protect — battery backup is included. It allows nine different ROM/RAM configurations. **£43 (c)**

ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board **£39 (d)** Battery Backup Kit **£18 (d).**

RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. (Allows other units to be fitted inside the BBC). Absolutely no soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. All the hardware to take the RAM is already fitted e.g. battery backup. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. **£86 (b)**

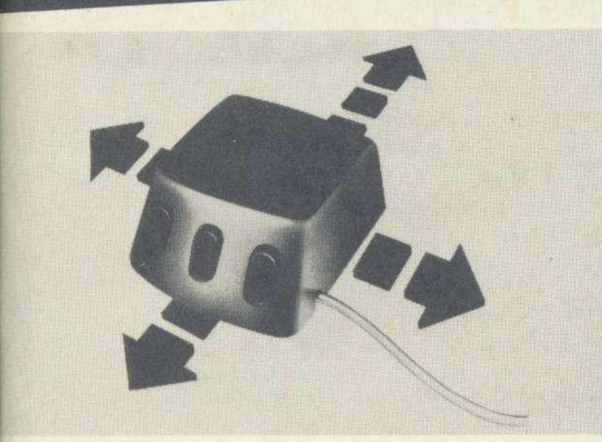
ARIES B-12 Board £40 (d) **ARIES B-20 Board £78 (d)**

RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function, instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.

RB-2 (with 'microdraw').	£52 (b)
RB-21 (with 'icon artmaster').	£60 (b)

AMX MOUSE



This sophisticated mouse has many advanced features such as Icons, Windows etc. The supplied 'AMX ART' is a superb, yet simple-to-use CAD package allowing the creation of amazing graphical designs. A screendump for drawings is included. It can also be used with Wordwise/View to replace the cursor keys. Supplied complete with CAD Package, ROM and full instruction manual. £69 (b)

AMX DESK An organisational program, including memo-pad, telephone/address book, diary, alarm, calculator etc. On Disc. £22 (d)

AMX PAINTBOX £13 (d)

AMX UTILITIES Provides new drawing facilities including Zoom, colour sketch and more. On Disc. £13 (d)

ACORN TELETEXT ADAPTOR £192 (a)

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This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £282 (a)

DATABASE MANAGMENT SYSTEMS

GEMINI DATAGEM features include * almost unlimited file size (max 10Mbyte) * supports up to 4 drives * Max of 5000 records per file * max 6K record size * max of 62 fields * generates form letters from records. Please ask for leaflet. £68 (c)

VIEWSTORE An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. £52 (d)

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. Its printer configuration suits any BBC compatible printer. £69 (d)

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MASTERFILE II The new version of the popular general purpose file management system. It allows large amounts of information to be stored and processed. It is extremely powerful yet flexible to use. The disc version allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. Typically, using 5 fields, about 2000 records may be stored on a 100K disc. This latest version features many new facilities including use with WORDWISE/VIEW £16.50 (d) Disc (80 or 40T).

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WORDSTAR PROFESSIONAL £310 (a)

WORDSTAR £275 (a) MAILMERGE £145 (a)

DBASE-II Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation and maintenance through to running accounting ledgers and payrolls. In addition to standard database features it provides much more. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data, and fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, time billing, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful. £335 (a)

SuperCalc-2 A powerful decision making tool which helps to solve complex 'What if...' financial modelling and forecasting questions. With a working area of 63 columns and 255 rows, Supercalc 2 takes full advantage of colour and full memory. It allows consideration of different spreadsheet files, sorting, a wide choice of formats. Full documentation with easy to follow lessons and single key commands make the use of Supercalc2 very easy. Separate windows provide for display of results and formulae simultaneously. Calendar and date calculations simplify calculations on loan repayment and periods. £180 (a)

Pro-Pascal A full implementation of the International Standard for Pascal (ISO 7185) apart from the optional conformant parameters feature. In addition to the standard features of Pascal, Pro Pascal includes: dynamic strings for character and string manipulation, 9 digit integers and random access file handling for data processing applications, single and double precision floating point arithmetic, an assembler level interface for systems programmers, and separate compilation of program segments for building libraries of commonly used procedures and enabling very large object programs to be constructed. Pro Pascal is a 3 pass compiler, converting a source program into efficient Z80 machine code. The package includes a compiler, run-time library, link editor, library manager and cross referencing utility. £220 (a)

BSTAM A telecommunication facility used for transmitting any size CP/M file. £165 (b)

Other packages available include CIS-COBOL, INFOSTAR, DMS +, FMS, SAGE, ATITUTORIALS, MACRO-80 etc. Please telephone with your requirements.

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(d) £1.00.

ROMs/SOFTWARE

WORD-PROCESSORS

VIEW Acorn's version V2.1 word processor rom. Advantages include printing straight from memory and editing in any mode. £48 (c)

VIEW VERSION VS.O Also compatible with BBC +. Complete with Printer Driver Generator.

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £52 (c)

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £13 (d)

WORDWISE One of the most popular word processors for general use. £34 (d)

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. £49 (d)

SPELLCHECK-I £15 (d)

SPELLCHECK II A ROM based fast machine code program that works with both VIEW and WORDWISE. Vocabulary disc supplied with 6000 words can be expanded to well over 17,000 words on 100K drive. Fully compatible with 6502 second processor. £24.50 (d)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £48 (d)

ULTRACALC 2 This enhanced version of the original BBC Publications popular spreadsheet ROM includes many new features including full compatability with the 6502 2nd processor running as HiCalc allowing 44K of user memory, operate in any mode, greater flexibility in printer control, spooling as ASCII file etc. All these features are in addition to the existing powerful features such as handling of labels and numbers as values. Column width control and features normally found in well designed spreadsheets. £55 (d)

INTERSHEET The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. £49 (c)

INTERCHART Graphics Package. £38 (d)

LANGUAGES



META-ASSEMBLER. Editor/Assembler, Macros etc includes 65xx, 68xx, 8048, 8088, Z80, 68000, Z8000, 8086-8088 etc. Phone for details. **ROM and Disc** £69 (d)

6502 DEVELOPMENT PACKAGE A Macro-Assembler with utilities for use with the 6402 2nd Processor. Enables the serious programmer to develop large programs in assembly language. £43.35 (d)

ISO-PASCAL Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £60 (c)

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £60 (b)

BCPL A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. £52 (b)

BCPL CALCULATIONS PACKAGE Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calcultion files, example files and a comprehensive user guide. £17.30 (b)

BCPL STAND ALONE GENERATOR Utilities in this package enable the programs developed using the BCPL ROM to be converted so that they can be run on any BBC micro whether it has a BCPL ROM or not. Stand alone programs for other 6502 based systems can also be developed. £43 (d)

ACORN LISP Rom £43 (d); **FORTH** £43 (d); **COMAL** £43 (d)

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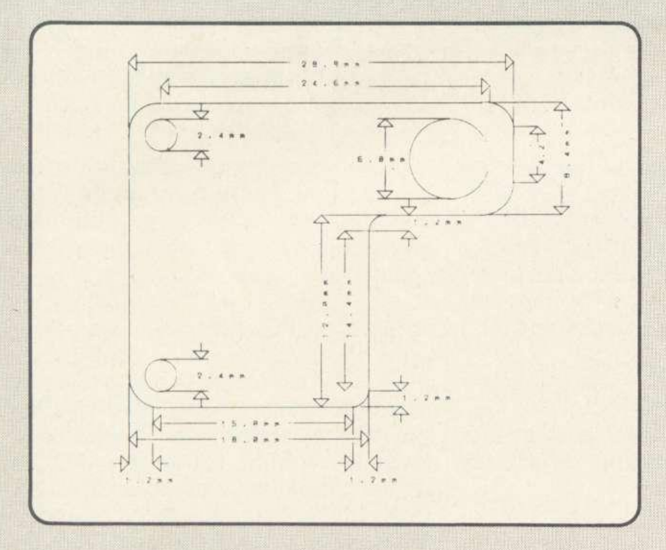
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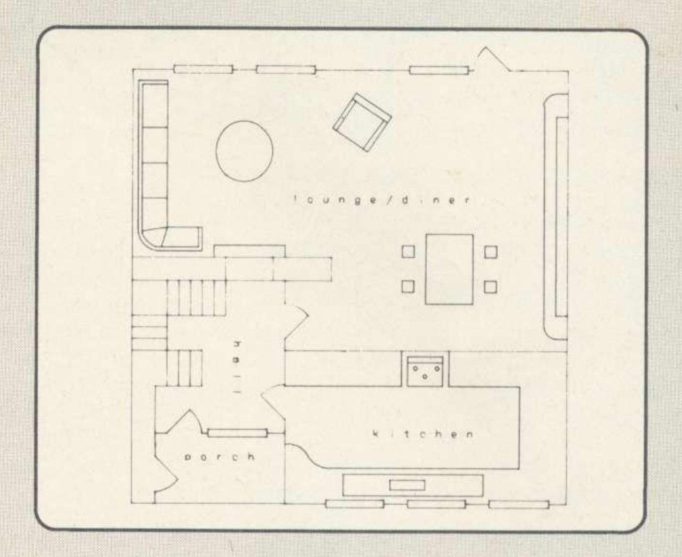
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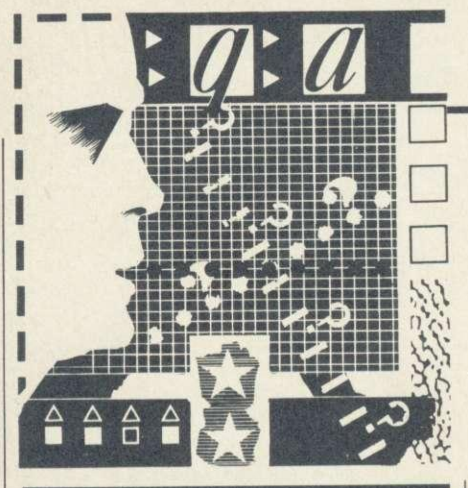
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Martin Phillips unravells logical operators, gets you started with *View* and takes a close look at non-functioning keys

Logical operators logically looked-at

THE three commands AND, OR and EOR are among the most difficult Basic concepts to understand, yet they have a variety of uses in programming, especially for graphics.

Each of them only operates when certain combinations of conditions are met. It's sometimes easiest to think of them in terms of light bulbs controlled by two or more switches – but more of that later.

They're vital when you want something to happen depending on other events. For example, an astronaut can only enter or leave an airlock when just *one* door is open (an example of EOR). Then a car might only start in an educational game when the driver's door is closed *and* his seat belt is fastened (the AND command). When you go to a computer show, the doorman will only let you in when you've paid £2 *or* you've got a ticket already.

As far as your computer is concerned, the AND, OR and EOR commands are called 'logical operators',

Denary	Hex	Binary
0	&0	0000
1	&1	0001
2	&2	0010
3	&3	0011
4	&4	0100
5	&5	0101
6	&6	0110
7	&7	0111
8	&8	1000
9	&9	1001
10	&A	1010
11	&B	1011
12	&C	1100
13	&D	1101
14	&E	1110
15	&F	1111
16	&10	10000
17	&11	10001
18	&12	10010
19	&13	10011
20	&14	10100

Table 1. Comparing numbers in denary (base 10), hex (base 16), and binary (base 2)

and they work by considering each bit of a binary number. So first of all we'll compare numbers in their denary (ie, the decimal system based on 10), hexadecimal (the number system based on 16) and binary (based on 2, the way computers work with everything being 'on' or 'off') forms.

Table 1 shows how the numbers translate between systems.

You'll see from the table that 13 in denary (base 10) is 1101 in binary (base 2), that is:

1 unit
0 twos
1 four
1 eight
1+4+8=13

and that 21 in denary (base 10) is 10101 in binary (base 2):

1 unit
0 twos
1 four
0 eights
1 sixteen
1+4+16=21

AND is a logical operator between two binary numbers producing a result which contains 1s where both the operands (the two numbers to be ANDed) contain 1s but leaving 0s in all other positions. Thus:

5 AND 6=4

By now, most readers not used to all this will be totally confused, so let's take it one step at a time. First change 5 and 6 to binary. 5 becomes 101 in binary, and 6 becomes 110 in binary. Now compare each number bit-for-bit:

Fours	Twos	Units	
1	0	1	(five)
1	1	0	(six)

The only column which contains a one for both numbers is the fours column. Therefore in the ANDed result the fours column will have a 1 in it and the units and twos columns will both contain a 0. This gives the binary number 100 which is 4. Think of it as a light bulb with two switches, where both have to be 'on' for the light to work.

OR, which is sometimes called the 'inclusive OR', is a logical operator between two binary numbers producing a result which contains 1s where *either* number contains a 1 – in other words when *at least one* light switch is 'on'. Thus:

5 OR 6=7
101 OR 110=111

EOR is the exclusive OR. It is a logical operation between two numbers and the result contains a 1 at those bit positions where one, and only one, of the operands contains a 1. At all the other bit positions the result contains a zero. Thus:

5 EOR 6=3
101 EOR 110=011

Still confused by all this? Try entering listing 1 below:

```
 10 REM Listing 1
 20 MODE 1
 30 GCOL 0,1
 40 MOVE 100,100:MOVE 800,300
 50 PLOT 85,800,700
 60 GCOL 3,2
 70 VDU 5
 80 MOVE 388,512
 90 PRINT"Press space bar"
100 REPEAT:UNTIL GET=32
110 MOVE 388,512
120 PRINT"Press space bar"
```

Listing 1. Demonstrates the use of EOR in graphics work

A red triangle should appear on the screen with the words 'Press space bar'. The letters 'space b', which are superimposed on the triangle, appear in white, while the other letters are printed in yellow. Why should this be?

First let's look at the values specifying colours in mode 1, which need only the last two binary digits:

	Denary	Hex	Binary
black	0	&0	00
red	1	&1	01
yellow	2	&2	10
white	3	&3	11

Next let's look at the GCOL statement, which handles two numbers separated by commas. The value of the number before the comma specifies the mode of action. For example:

0 means plot the colour specified.
1 means OR the colour already there.

yellow EOR black	(10 EOR 00) gives 10 which is yellow
yellow EOR red	(10 EOR 01) gives 11 which is white
yellow EOR yellow	(10 EOR 10) gives 00 which is black
yellow EOR white	(10 EOR 11) gives 01 which is red

Table 2. How yellow EORs with background colours

2 means AND the specified colour with that already there.
3 means EOR the specified colour with that already there.
4 means invert the colour already there.

The number following the comma in the GCOL statement defines the colour to be used in future.

Line 30 of the program sets the graphics colour to be red. The triangle is then drawn. Line 60 says that all future graphics work should EOR the background colour with colour 2 which is yellow (table 2).

EOR has been chosen for this example because, apart from GCOL0, GCOL3 is by far the most useful of the GCOL statements. Using listing 1, if the space bar is actually pressed the lettering will disappear without affecting the rest of the screen display. This can be used for all sorts of elegant screen effects. The fact that the lettering changes colour depending on the background colour also means that no part of the lettering is obscured by being printed in the same colour as the background. A similar effect can be obtained by using GCOL4. Try different GCOL options and colours in lines 30 and 60 of listing 1 and note the effects.

To illustrate the usefulness of being able to 'unwrite' any information put on the screen, listing 2 will place 10 triangles haphazardly on the screen in random colours. It will then print a disc catalogue on the screen (sorry – it won't work with cassette). When the space bar is pressed, the disc is catalogued again, and EORs the previous lettering. Thus the lettering disappears as it is printed in the background colour this time. The RND range is set higher than the maximum screen co-ordinates to ensure that the triangles cover a large part of the screen.

```
 10 REM Listing 2
 20 MODE 1
 30 FOR N=1 TO 10
 40 GCOL 0,RND(3)
 50 MOVE RND(1500),RND(1500)
 60 MOVE RND(1500),RND(1500)
 70 PLOT 85,RND(1500),RND(1500)
 80 NEXT N
 90 GCOL 3,2
100 VDU 5
110 MOVE 0,1023
120 *CAT
130 REPEAT:UNTIL GET=32
140 MOVE 0,1023
150 *CAT
```

Listing 2. Shows the usefulness of 'unwriting' information on the screen

One important use of the logical operators is in 'masking'. This is handy because it allows, say, just one bit of an eight bit number to be isolated. One example is to look at a single bit of the user port. When the user port is set to receive data from the outside, ie, to input, location &FE60 will contain the state of all eight lines of the user port. To check on the status of line 3 (the fourth line), &FE60 can be 'ANDed' with 8:

PRINT (?&FE60 AND 8)

Either 0 or 8 will be printed out depending on the status of line 3. To test if line 3 is set to logic 1 we could write:

IF (?&FE60 AND 8) = 8 THEN . . . .

or to wait for line 1 to go to logic 0 we could say

REPEAT: UNTIL (?&FE60 AND 2) = 0

Rather than saying line 1 or line 3 we usually refer to the eight user port lines as PB0 to PB7. PB stands for Port B: Port A is the printer port.

Masking works because, in the case of the latter example, AND will only give a result where both bits are set to 1, and by ANDing with 2 we ensure that only the two's bit is set to 1.

Another use of masking is with the USR call.

This is similar to CALL except that at the end of the routine it's possible to get the values from the processor status register, the X register, the Y register and the accumulator. Listing 3 illustrates the use of USR.

```
 10 REM Listing 3
 20 DIM P% 50
 30 [OPT 1
 40 .test
 50 LDA #&35
 60 LDX #&2A
 70 LDY #&7C
 80 RTS
 90 ]
100 PRINT"Output from USR ca
ll is ";
110 PRINT~USR(test)
```

Listing 3. This listing demonstrates USR, another use of masking

When run, the program prints the value &307C2A35 corresponding to the values in the four registers. To find the value in the accumulator, change line 110 to read:

110 PRINT ~(USR(test) AND &FF)

Now all the other values are masked off and the result printed out will be &35. To read the Y register value then use &FF0000 as the mask:

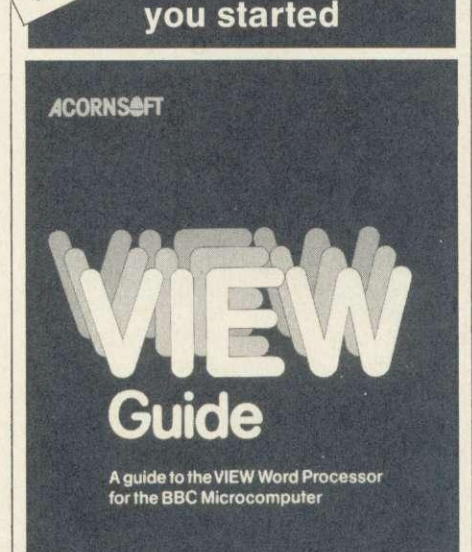
110 PRINT ~(USR(test) AND &FF0000)

Now the result will be given as &7C0000. To get the correct value it's necessary to use the statement DIV. Change line 110 to read:

110 PRINT ~(USR(test) AND &FF0000) DIV &10000

Now the result will be &7C, the value placed into the Y register.

£5 Views on getting you started



***View* offers more facilities for the serious wordprocessor user'**

WORDPROCESSORS are most useful programs. Once the novelty of a new computer begins to wear off, owners look for new uses, and that is the time to turn to wordprocessors. However, they are not all that easy to use.

There are several available for the BBC micro and the Electron, each with its advantages and disadvantages. When you talk to other users about the best wordprocessor to buy, they'll usually claim that the one they have is superior because few can afford to try all of them.

It's rather like asking a group of people which car is the best – they'll almost always choose the one they own and are familiar with.

Out of all the wordprocessors available, there are two in most common use – Acornsoft's *View*, and Computer Concepts' *Wordwise* or *Wordwise Plus*. *Wordwise* was one of the first word-

processors sold on a chip for the BBC micro, and its popularity was enhanced by its ease of use. It has since been extended and improved to the *Wordwise Plus* model. *View* is also a ROM chip and has the advantage of being available for the Electron as well as the Beeb. Also Acornsoft makes a children's wordprocessor, *ABC*, and the files from this can be entered into *View*.

My own evaluation of the difference between *Wordwise* and *View* is that *Wordwise* is the easier to get into and to use, but *View* offers more facilities for the serious wordprocessor user. For instance, you can format and display a document on the screen in *View* quite easily, but have to switch between an editing screen and a display screen with *Wordwise*. Hence it is difficult to format charts correctly on *Wordwise*.

Recently I have had several letters asking for help to get started with *View* (Mr J Elmslie from Godalming wins £5 for his query) and for help with *View* printer drivers.

As usual the manuals leave a lot to be desired. They are good once some familiarity with the program has been gained, but difficult to get into. Therefore this month I shall show you how to get started with *View*, and next month will explain about the printer drivers. To get into *View*, first type:

*WORD <RETURN>

not *VIEW as you might expect. <RETURN> means press the Return key. The screen will clear and a few lines of text will appear. Below these you'll see the prompt:

=>

Any Beeb or Electron screen mode can be used, but the best compromise is mode 3. (If using a TV to display the picture, then you might find it better to use mode 6 on the Electron or mode 7 on the BBC micro.) This can be selected by typing:

MODE 3 <RETURN>

Now the writing on the screen will become smaller. To enable some text to be typed in, enter:

NEW <RETURN>

Once this has been done, press Escape to change to the text mode. A 'ruler' will appear at the top of the screen, and the letters 'FJ' at the left. If using mode 3, the ruler shown is only 34 characters wide, so press:

CTRL—f5

(default ruler) and this will change to 74 characters – an ideal size for both the screen display and for output to a printer. I find it useful to also press:

CTRL—f4

This puts *View* into insert mode, so that it is much easier to alter letters or add words.

Now simply type in your text. If odd things happen when you try to insert words, and all the text moves over or is lost off the right of the screen, don't worry, just move the cursor to the top of the paragraph and press function key f0. This will tidy up the paragraph (or block of text). To save the text or print it out, press Escape to return to the command mode. To save the text to disc or cassette using the filename JUNK, type:

SAVE JUNK <RETURN>

To print the text out type:

PRINT <RETURN>

To load the file back in again later type:

NEW <RETURN>
READ JUNK <RETURN>

Do remember that, as with BBC Basic, NEW will clear any text already in memory. Disc users can do the same thing in one line using:

LOAD JUNK <RETURN>

That, then, is a simple way of getting started with *View*. As with many things, it gets easier with practice.

One tip I always use with *View* is to change the background colour to blue, which I find easier to read. The text is printed in white and there are black lines between each line of text. This is done after changing mode by pressing the following keys:

<CTRL—S>04000

Nothing will appear on the screen while this is being done, but the background colour will change to blue when the last 0 has been typed in. Notice that you don't need to press the Return key. Different text and background colours can be selected in this way – see the *View* user guide for more details. It's worth experimenting here to ensure that the best combination of colours are used for your monitor or TV, but remember this will not work for mode 7.

IF YOU have a technical hitch or a programming problem let Martin Phillips give his diagnosis. We'll pay £5 if you raise a really interesting point. Please give full details of the system you're using and include a listing where appropriate, making your question as specific as possible. WRITE TO: Hints & Tips, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

Don't go against the spin

DON'T be tempted to cut a second write-enable notch on the other side of your discs so that they can be turned over and effectively have a double-sided disc.

The black disc wallet is lined with a J-cloth type fabric to prevent scratching and keep the disc clean. This develops a nap so that a disc will spin a lot easier in the direction of motion than it will against it.

Apart from the damage that could be done to the disc itself by trying to make it double-sided, reversing the direction of motion can cause many disc read errors, and can strain the disc drive motor.

Monitor can end micro's hang-ups

SOME programs are protected to such a degree that it's necessary to switch the Beeb off and on again to get them out of memory.

Sometimes, especially after it has been on for a long time, the computer will not restart but hangs up after one short bleep.

If the micro and monitor are connected to the same socket then the cure is very easy. Simply switch off the whole apparatus at the mains rather than just at the back of the computer and then switch on again.

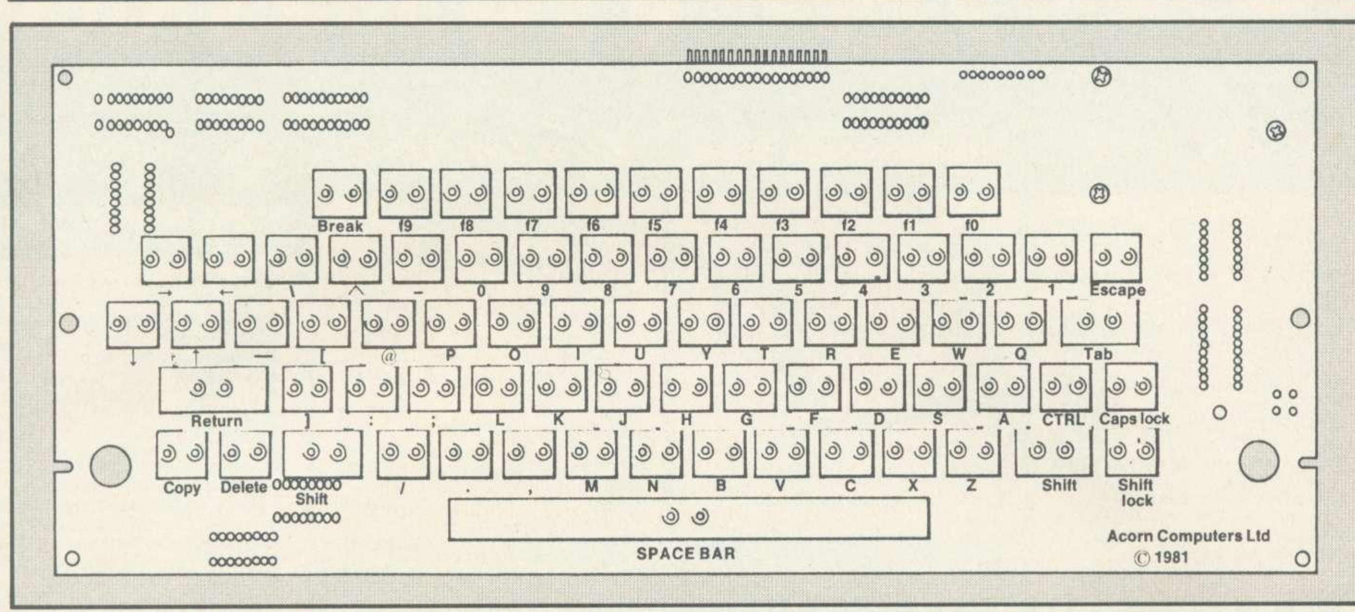
I believe the reason this works is that the monitor draws a large current for a fraction of a second, but this enables the computer to switch on slowly. It should be noted, however, that the monitor should normally be turned off using its own on and off switch, and not just switched off at the mains.

No more spaces

SEVERAL readers have written in to point out that in an earlier article on using @% in the PRINT statement, I should have mentioned that there is a simpler way to ensure that leading spaces are not printed with numbers – use a semicolon between the PRINT and the number.

Compare the difference:

```
PRINT 1234
PRINT; 1234
```



This diagram of the keyboard circuit board should help you to mend keys that are not functioning. Two solder pads relate to each key and this diagram shows where to find them on the circuit board. When you have, trace the tracks leading from the keys until you find the break

Tracking down the cracks

IT'S very annoying to discover that one of the keys or a group of keys has stopped functioning. At first this might go unnoticed if the key operates sometimes but not always. You'll often find the keys that fail are at the right-hand side of the keyboard.

The major reason for a key not functioning is that a track has broken on the back of the keyboard circuit board.

This usually happens because the key was not fitted fully up to the circuit board in the first place, or because of heavy-handed use.

Fortunately the cure is quite easy provided you have a good soldering iron. The connections for the keys form a matrix as can be seen from the keyboard circuit board. By checking carefully to see which keys do and do not work, the actual position of the break can be determined. Then you must remove the top cover of the Beeb, unplug the keyboard connector and unscrew the keyboard circuit board. You must also take care to unplug the speaker connection before removing the board completely.

Finding the actual break is usually very difficult, and almost always occurs near the solder and where the key is soldered. The crack in the track can be so fine that it is very difficult to see, so use a magnifying glass and bright light. A trial-and-error approach on suspect areas is usually effective.

The break in the track can be mended by first cleaning the offending area carefully with a sharp craft knife and then bridging the gap with solder. If the break is bad, then solder a short piece of wire across the break. If the track has broken because the key was not fully seated on the circuit board, then resolder the key first to ensure that it is seated correctly.

On the older sort of keyboard, the two white plastic parts that link either end of the space bar with a wire rod under it have a habit of working loose – the space bar gets very wobbly. If this has happened then hunt around carefully inside the machine to find them – they are only 1cm long. Glue them in place if they have come loose – use something like Evo-stick to secure them to the space bar, but be careful not to get the glue on other parts of the computer.

Flickering in Brazil

WHEN he fitted a sideways ROM board to his BBC micro Mr Carraher from Brazil found that the screen picture became unstable and produced a flickering display.

There are two possible reasons for this. First the combination of the 220 volt supply and the extra power drawn by the ROM board have combined to reduce the supply voltage to the BBC micro's video circuitry to a point at which it lacks stability. The second reason could be that on fitting the ROM board and bending the terminals on the supply leads over, this has made a bad connection between the supply leads and the computer board so that the supply voltage to the video circuit is similarly reduced.

Quickfire questions

DON'T waste money on expensive disc drive head cleaners. The drive manufacturers do not recommend them – they say they are abrasive and do more harm than good.

DID you know that under the left-hand side of the keyboard (from the front) there is a small volume control that can be adjusted with a screwdriver to change the sound volume level? It can only be accessed by taking off the top cover of the micro.

MANY schools and some homes now possess TVs which can also be used as monitors. These can be connected to the composite video of the BBC micro, but the picture will be in black and white. On the circuit board near this socket on all but the earliest machines there is a circuit board link (link 39). If this link is made (bridged) then the composite video will give a colour output. Note that the newer Radio Rentals schools sets must have a dummy sound plug inserted to use the TV as a monitor.

IF using the RS423 socket, for instance for a modem, it's possible to put the plug in two ways. Once the correct way has been found (usually by trial and error), stick a label on the plug to mark the top. Use a soldering iron on a plastic plug to make a permanent mark.

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ASSEMBLED FOR STYLE

Tessie Revivis turns to how to present assembly language listings in her second article on style

REGULAR readers will be well aware that the programs presented on the yellow pages have adopted a certain style over the past year or so. We at *Acorn User* hope this has made them easier to read and enter. Last month I discussed the format we use for Basic listings, so this month I'll turn to assembly langauge.

These notes are by no means conclusive, and readers comments and feedback are most welcome – mark your letters 'Program Style'.

Assembly program listings will invariably form part of a Basic program that will take care of variable definitions and FOR. . .NEXT loops. All programs should contain the standard *Acorn User* five-line header and must be written in Basic 1. These and all the other notes given last month also apply to the writing of assembly language programs. Functions to simulate the Basic 2 EQU commands can be found in the September issue too.

Where an assembly language routine is incorporated as a procedure into a larger Basic program, if possible use the DIM method for reserving space for assembler code as illustrated below. Similarly the variable 'pass' as the control option variable in conjunction with OPT, eg:

```
70 DIM mcode 100
80 FOR pass = 0 TO 3 STEP 3
90 P% = mcode
100 [OPT pass
110\
:
300 ]
310 NEXT pass
```

In such cases the assembly listing should form a procedure and called as such, eg:

```
60 PROCassemble
70 PROCchecksum
80 PROCdemo
90 END
```

Where a program is to be used as a stand-alone piece of machine code it should be assembled into a suitably safe area. Below the screen memory will normally suffice for long programs. See table 1 for short routines.

&C00-&CFF	The user definable character buffer
&B00-&BFF	Function key buffer – note that keys must be turned off with *FX225 first by the machine code, otherwise unpredictable results may occur
&A00-&AFF	The cassette input buffer/RS423 input buffer – note that tape and RS423 users should avoid this area except to store data once a program has been loaded
&900-&9FF	The cassette output buffer/RS423 output buffer – note that tape and RS423 users should avoid this area if the machine code programs perform a save to tape or RS423
&400-&7FF	This is the main memory workspace. It may be used to run a pure machine code program that contains no Basic or other language commands
&A0-&A7	This space is available to tape users only. It is used extensively by disc and network filing systems
&90-&9F	This space is available to tape and disc users. It is allocated to the Econet system, so may not be used by networked micros
&70-&8F	This memory is available to everyone

Table 1. These areas are of possible use for short routines

The assembly language mnemonics should be limited to one per line number, using the upper case character set only. Mnemonics should not be 'tabbed' out from the line numbers. Labels should be lower case throughout, and any use of numbers limited to the last character, eg, over1, over2, etc. Where possible label names should reflect the code to follow and each label should be assigned to a separate line. This approach makes assembly listings much easier to type in and read, and therefore simpler to debug. It also makes them more straightforward to print in the pages of *Acorn User*.

Always incorporate a checksum procedure to verify assembled code and to report any errors.

When a technique is being illustrated, implement the assembler as a subroutine. Code should be fully relocatable – use forced branches rather than absolute jumps, eg:

```
CLC
BCC start
```

This technique will also ensure branches are used to repeat loops, eg:

```
BNE start
:
```

rather than

```
BEQ over
JMP start
.over
```

Where space permits use a backslash to show loops, eg:

```
280 STA temp
290\
300 LDY #&FF
310 .loop
320 LDA (topvector),Y
330 STA (store),Y
340 DEY
350 BNE loop
360\
370 LDA temp
```

All data tables and byte storage areas should be placed at the end of the code, where possible, and space should be made available for them by incrementing P% by the appropriate amount, using a suitable FN call.

Do not use calls into the Basic ROM. The *only* exception is if the article is of a descriptive nature about the Basic ROM. In this case Basic 1 and 2 addresses must be listed.

Finally, there are times when some of these rules must be broken – but they are the exception rather than the rule – and must justify the problems they create. If you decide you must break a rule, do tell us first!

Write to: Letters, Acorn User, Redwood Publishing, 68 Long Acre, London WC2H 7ED

BBC micro– under expanded?

Sir, I bought a BBC micro because of its expansion possibilities which would enable me to keep up with technical advances. Recent events now have me rather worried.

The B+ is a complete waste of time as no Beeb owner is going to pay £499 for this machine: they are more likely to buy an Aries B20 board to increase memory capacity.

As the head of department in a secondary school I read with interest the article on the possibility of a new government-initiated operating system for school micros. I am amazed that Acorn has not produced a 16-bit add on. I wonder what the scrap value of our Beebs is.

Acorn does not seem to have bothered to find out what educational institutions want in terms of hardware. How long can Acorn continue in the field of educational computing after recent events?

J C Mackey
Leics

The younger the better

Sir, I have been surprised at the ease with which pre-school-age children can become used to computers, and get a lot of fun from them.

I have written several programs of an early learning nature. Of these, my three-year old son Jonathan's favourite program is a 'painting' program which operates with a joystick – he is easily able to select colours and shapes and place them on the screen.

Another program which he enjoys has a teddy bear who travels about the screen hiding behind large squares. The bear is just visible in the gaps between the squares, and squares can be removed one by one by pressing appropriate keys. When the teddy is found, a nursery rhyme is played.

R W Wills
Isle of Wight

Three-year-old Jonathan Wills enjoys using the Beeb



RAMming more in

Sir, What an excellent idea the sideways RAM article was (June, page 119). So many of us have a ROM board with capacity for RAMs and so little has been written about them.

Besides utility and buffer programs, would it be possible for Richard Harris to advise on the following?

1) To recover the disc user space between &E00 and &1900. This would help us to run those TAPE programs which also load files of data.

2) To replace screen memory, especially in mode 3 which uses an extra 15k. *Wordwise* text could be previewed and *Beebcalc* or similar could be seen in 80 column mode with security.

I have entered the programs on pages 102 to 107 of the June issue, and my checksum for 'TESTRAM' is 194656. I am not getting any errors indicated. I notice that lines 20900 and 20920 are not complete and I wonder whether there may be any other typographical omissions.

Thank you for your excellent magazine which I have taken on and off since July '82 when it cost £1 for 40 pages.

Peter Jackson
Glos

Thank you for your comments! I suspect that it might be possible to do 1) with a couple of crafty machine code patches. Perhaps someone might like to try?

Doing 2) would not be possible though you should be able to use the sideways RAM for text or data storage, but, again, this would need a machine code patch.

The July and August issues contained amendments to lines 20900 and 20920.

Pointing Acorn in the right direction

Sir, I have heard some of the reorganisation plans for Acorn and feel that within the company there is considerable uncertainty about what direction it should take. I wondered, therefore, if *Acorn User* could provide a few useful pointers – as Simon Dally remarked, in the introduction to his book of puzzles, the readers of *Acorn User* are more intelligent and more good humoured than the readers of other computer magazines. Maybe this intelligence could be harnessed to establish what the users of Acorn home computers are looking for.

To start the ball rolling, let me make three points.

The top management of Acorn must go if credibility is to be re-established. This may seem a little harsh on the founders of the company but their mistakes have been both drastic and public, and they seem to have a contempt for other mortals which cannot be supported in a public company – examples range from brawling in pubs to failing to notify the Stock Exchange (for about a week) of the separation from their financial advisors.

At the 'user level' there are further examples. For instance, Acorn won the educational contract mainly, I suppose, because its computer had more access ports than any other, and there must have been the presumption of software support. If the Acornsoft program on chemical structures (which could have been written by any average 11-year-old) is anything to go by, the support was negligible until quite recently.

Consider also *Elite* – without doubt one of the finest computer games yet written. Anyone who has struggled through to an *Elite* rating will know that the much advertised 'certificate' is a cheaply duplicated letter bearing no personal information.

My second point is that I question the need for the continuous expansion and development of the 'hobby' machine. Anyone can appreciate the advantages of 16 and 32 bit machines over the meagre eight bits of the BBC micro, but do the majority really need so much raw power at home? Certainly 32k is restricting and the B+ was clearly 'too little, too late'.

'More memory' is the plea of the software houses and, like everyone else, I have had my programming brought to an abrupt halt with the 'No room' message. My ideal would probably be a BBC computer with 128k of memory but I would not want to trade-off any of the existing facilities.

Above all, my standard model B is the most interesting and versatile toy that I have ever had – rather like the motor and gearbox that you could get for Meccano, there are masses of add-ons available but the driving force is ready and waiting to cope with very elaborate 'models' without being so complicated that only the boffins know what is going on inside the works.

Finally somewhere within the 'add-on' capabilities, interactive laser video must surely become a winner. I have a potential budget of £50,000 for a specific laser disc and program. Philips has been most helpful in supplying information but Acorn has not bothered to reply to my enquiries. In my opinion, a little more corporate effort channelled in this direction would pay handsomely.

I believe there is a steady and continuous market for the Acorn BBC micro, bigger and better in its stand-alone state maybe, through the ever increasing range of its peripherals.

M J H Leete
Cheshire

Scrolling into View

Sir, In view of the popularity of the Watford Electronics 32k RAM Board, which also causes the same scrolling problem when used with *View* A2.1, I thought that the following modifications to your listing given on page 112, July, would be of interest. Alter the following lines:

```
60     xramon=&72
190    LDA #xramon
```

I have built a !BOOT file as follows to call XWORD, and to set up *View* with the SCREEN printer. The inclusion of the Small Buffer (line 3) reduces the Bytes Free from 25854 to 25086. This is an advantage with the SCREEN printer which is otherwise garbled.

Line 2 causes a Break to be generated, which may be required to switch on the sideways RAM.

```
*RAMON|M
CALL !-4|M
*BUFFERON S|M
*XWORD
MODE3|M
NEW|M
*TOSCRN
*COMPACT0|M
```

John D Stettaford
Herts

Legal wrangling

Sir, I was interested to see Bill Penfold's article 'Lessons for computers in legal history' in the July issue. More instructive was his reliance on a text issued so long ago – so that he appears not to have had his attention directed towards the Contempt of Court Act 1981 (c.49).

Even more surprising is the apparent failure of the various agencies to which he directed his inquiries to ensure that he checked on the details of this Act (as well as developments in case law in recent years). Consider the significance of, for example, the provision which deals with the limitation of the scope of the strict liability rule (s.2), which includes the following:

'(1) The strict liability rule applies only in relation to publications, and for this purpose 'publication' includes any speech, writing, broadcast *or other communication in whatever form,* which is addressed to the public at large or any section of the public.'

The words in italics appear to be wide enough to cover bulletin boards (don't they?). You will find that some of the other provisions of the 1981 Act are equally serviceable for the world of computers and bulletin boards!

By no means do I claim that the law is fully equipped to deal with all facets of 'modern technology', but you might at least try to double-check before you criticise the (alleged) shortcomings of 'the system'.

Good-humouredly,

Emlyn Williams
Revising Editor
Jowitt's Dictionary of English Law

Bill Penfold replies in even better humour: What is Mr Williams on about? He complains that I have not taken into account the 1981 Contempt of Court Act and chastises me for relying on an ancient, bewhiskered copy of McNae's *Essential Law for Journalists* – published back in the early swinging sixties – which says criminal contempt includes doing anything tending to prejudice the course of justice. The point I was making was that a certain editor narrowly avoided getting into trouble by commenting on a case which, at the time, was still before the courts. Is Mr Williams suggesting the 1981 Act changed that?

Or is he going on about the different practical, legal problem confronting broadcasters and printed word journalists? Surely Mr Williams must recognise that in practice a weekly magazine could go on sale containing reports which, *at the time of publication*, were not in contempt. But while the publication is still on the news stands, charges are brought which makes the matter *sub judice*. The point I was making was that such a publication is unlikely to get done for contempt. However, if the radio broadcast a report with exactly the same allegations but went out after the charges had been brought, the broadcasters would be very likely to find themselves in dead trouble.

Or is Mr Williams suggesting the magazine's editor would, in practice – as distinct from some esoteric theory – be up for contempt unless he whipped round to all the newsagents in the country and withdrew his publication? In practice, I think he would find there would be no contempt charges.

Which brings us to the problem Mr Williams appears not to appreciate. Assume that same magazine story had 'gone up' on a Prestel page days earlier. Would it be treated like the magazine or would Prestel and bulletin boards – because like radio stations they have to be actively churning out their material – be regarded as broadcasting it contemporaneously? Frankly Mr Williams doesn't even attempt to answer this point.

It was because of this uncertainty that I most certainly did double-check – with the Home Office, with Prestel and with the Attorney General's office. And they all said they did not know the answer.



Man from Acorn

Sir, In August's offering from the 'Man from Uncle' some rather astounding pronouncements were made about the Graphics Extension ROM and the Basic Editor. Allegedly these two products access the screen directly and do not work with second processors. I would like to set the record straight.

The Basic Editor ROM does not poke the screen at all and is 100 per cent compatible with the 6502 second processor.

The Graphics Extension ROM is the official extension to the operating system and shares the special status of being the defined interface between the user and the hardware. It does make direct access to the screen as does the rest of the operating system's VDU driver software. However, it is also totally compatible with all three Acorn second processors (6502, Z80, 32016).

The only limitation is that the version of the Graphics extension ROM which is about to be released (V1.2) requires OS1.20 in the BBC micro, OS2.00 in the B+, and the Electron will require separate versions.

Paul Fellows
Languages Group Leader
Acorn

The best of British

Sir, Living in Australia can have its disadvantages when one owns a Beeb, the least of which is the gamble when buying a British-made peripheral. If something goes wrong, reliable backup and parts are non-existent.

However, a recent fault in our British Micro Graphpad has re-assured us that customer service is not dead. A short letter to the manufacturer outlining the fault resulted in a reply in less than a week. The conditions were analysed to be a damaged pen and a replacement arrived via Air Mail the same day as the letter.

It is obvious that the management and staff of British Micro value their customers anywhere in the world and are willing to properly back-up their excellent product. It would certainly be nice if other firms had the same attitude.

Lindsay Thachuk
South Australia

page 50 ▶

Strength of character

Sir, In his review of the Hershey Character Font Generator (July, page 163), Malcolm Banthorpe suggests that it is 'highly suitable for output to a plotter, provided you are prepared to modify the plotting routines'.

I have output some samples of this software on the Plotmate plotter. There is no modification required to the Beebugsoft software in order to produce this. All that is needed is to install the Plotmate driver before running the program. The driver intercepts all the graphics commands like MOVE, DRAW, PLOT and PRINT and draws on paper what is produced on the screen using these instructions.

G Pagan
Linear Graphics
Essex

Beebugsoft Hershey Characters

ROMAN FONT

on PLOTMATE

Hershey Character Font Generator output on a Plotmate

A helping hand

Sir, I was having difficulties with the cassette program of Richard Harris' ROM utilities and thought readers might be interested in the answer.

I have a Computer Village CVx16–2 ROM/RAM expansion board. I was able to load the sideways RAM from 'HARRIS1' easily and regularly but the computer would not recognise *HELP or any of the implemented commands. I eventually succeeded in obtaining a response (as it happened by error, after many trials) so that I was certain there was no fault with the program. However, when I switched off the power I could again obtain no response after switching on.

The recommended procedure for loading to the (battery backed-up) RAM is to write-enable, load the program, write-protect, press Break and then *HELP. The position at power-up is write-protect. Write-enable after switching on allows the program in RAM to respond correctly. This is mentioned in the manual for configurations 5, 6 and 8 but I have configuration 7.

Peter Davies
Notts

Getting on the right track

Sir, If you are thinking of buying a 40/80 disc drive for the flexibility it will give you, beware and read on.

I have just purchased a 40/80 track switchable disc drive from Viglen, to be used alongside other computers with 40 track Cumana disc drives in a school.

Viglen was told it had to be totally compatible for 40 track working before the purchase was made. Discs which have been written to on the 40/80 drive cannot always be accessed on a true 40 track drive due to the different head widths.

I approached all the disc drive suppliers at the Micro User Show, including Viglen, and was told by all except Opus that 40/80 switchable drives are *not* guaranteed to be totally compatible for 40 track working.

As far as I am aware *no* supplier states in its adverts or literature that 40/80 drives will read and write at 40 track but may not be compatible with true 40 track drives.

Don't get caught out like me having spent about £150 on a drive which does not do the required job and unable to get a refund.

Viglen has replaced my drive twice but the problem persists. I have no option other than to buy a 40 track drive and use the 40/80 drive in 80 track mode only.

I have owned my BBC computer for three and a half years and have all issues of your magazine – keep up the good work.

R P Dew
Bristol

V Boyd, managing director of Viglen replies: The following points apply to all disc drives regardless of supplier.

As all 40/80 track drives are in reality 80 track drives that have been switched so as to enable the stepper motor to double step, common sense suggests that the read/erase parts of an 80 track are about half the width of a 40 track drive.

Some makes of drives are more successful at double stepping than others. Mitsubishi, Shugart, Teac and Tec have, on the whole, given us no problems.

The earlier models of Canon (220 series) and Sanyo drives have both caused trouble in the past.

If you have a particular application which requires total compatibility, assuming your drive is correctly aligned, the following rules should eliminate any potential problems:

1. All writing of 40 track material must be carried out with a 40/80 track switchable drive (in a 40 track mode) *on a disc that has not been previously written to by any 40 track-only drive.*
2. A disc with data (including the formatting) written *only* by a 40 track dedicated drive, or written *only* by a 40/80 track switchable drive will be read by either type of drive.
3. If the disc contains data from both a 40 track *and* a 40/80 track switchable drive, then it is only *certain* to be read consistently by a 40/80 track switchable drive, and will in general be read successfully if files have not been deleted by the 40 track drive.

Unfortunately it is too complicated to explain, in the space available, the limitation of compatibility.

However, I would prefer in 99.9 per cent of cases to dual up drives with a larger capacity drive (40/80 track) and have the facility of reading and writing both 80 and 40 tracks rather than be limited with a rather outdated drive for the sake of 100 per cent compatibility.

Error of its ways

Sir, After having used my BBC micro for both personal and business purposes for more than two years, it surprised me yesterday by accepting a horrible Basic syntax error and it didn't detect it.

I was testing some machine code and using some pieces of Basic to see if it worked before writing the main driver in machine code. Once I spotted my error I tried it out on its own, and it still didn't work (ie, the Basic was accepted but the result was incorrect).

```
Y%=1:X%=X%=3:PRINT
X%,Y%
```

This will print Y%=1 and X%=0 and no syntax error will be spotted.

If one attempts to add another equal, such as X%=X%=X%=3 a syntax error will be reported.

Obviously in my case the error was produced by incorrect copying of a line of code, but the result was disastrous.

Koenraad Rutgers
Bucks

In fact the line X%=X%=3 is not an error of syntax at all – it is quite legitimate, but obviously not good technique.

X%=X% will return −1, ie, a false value. X%=3 obviously places 3 into X% which is true. The computer evaluates the line as X% equals X%=3 which returns 0 as the statement is true. The line X%=X%=X%=3 is not a valid logic assignment and will therefore generate an error.

Adventure call

Sir, We are appealing to your readers to help us collect information on adventure games. Anyone who has played any adventures on the BBC micro can write to us at the address below with any hints, tricks or titbits.

This is not a commercial venture, we are just a group of 'down under' adventure players who have been swapping information and thought it would be good to start a collection of interesting ideas.

ELDA
(Evil Little Dwarfs Association)
Box 308
East Melbourne
3002, Victoria
Australia

Boot on the other foot

Sir, Peter Rochford's disc menu article points out the difficulty of creating a !BOOT file on a disc which has been compacted without a !BOOT file already present.

To avoid the 'Disc full' message it is simply necessary to SAVE a file (its contents are irrelevant) called !BOOT first and then create the !BOOT file in the usual way.

Dr D T Wilkie
Stockport

Heart of gold

Sir, I sent off cash to Chase Data for *Vector 1* explaining that I did not own a cheque book. To my surprise, when *Vector 1* arrived there was a very nice letter saying:

'Please find enclosed *Vector 1* and I am also returning £10 so that you can open a bank account when you are older.'

I think this just goes to show there are some human people left in this world.

Stephen Gayler
Middlesex

Paying by plastic

Sir, Wayne Webb's letter (August) about faulty goods from a company that has gone out of business has prompted me to tell you of my experience.

I had a similar problem recently where goods purchased were faulty, but the retailer (having got back the item) was unwilling to refund the purchase price.

In this case I had bought the goods on my Access card, and was able to obtain a refund from Access under the Consumer Credit Act. Access at first denied any responsibility, but after some wrangling paid up.

I offer the following advice to potential mail order purchasers:

Always use credit cards for mail order purchases. All reputable companies accept them, and they do give added protection.

Never buy from a company that won't take credit cards: you have no protection if they go bust after taking your money.

If the goods you buy don't work, or don't meet the manufacturer's specification, demand an immediate and full refund.

Geoff Cox
Kent

Geoff's advice is sound but must be put in context. The Consumer Credit Act is a large, and in some cases confusing, piece of legislation.

We spoke to Access and they explained that first of all, for the buyer to have any claim, the transaction must be worth over £100.

If this is the case and there is disagreement, then Access will step in to arbitrate if a claim is made. If a company goes bust Access first advises the buyer to go to the liquidator, and only then will it look at the claim.

The company stresses that each case is considered individually, and there is no absolute rule.

Finally, remember that two to four per cent of every credit card transaction goes to the credit company, and these facilities are only available to companies with a certain turnover. This means that small traders cannot afford to run credit card schemes.

Electron-ic education



Electron: useful in education

Sir, I have recently purchased an Electron, mainly to use for my daughter's education.

Golem Ltd advertise a good selection of software and although it has sent us three tapes, the last one tested before dispatch, we have been unable to load them. All other tapes are easily loaded and we have tried every volume pitch possible.

Golem has offered us our money back but we are terribly disappointed.

Could you let us know the address of a good software house for educational material which will be suitable for our Electron?

W R T Marsh
Inverness

Your problem of being unable to load the cassette might be caused by the tape recorder. Try cleaning the heads of your recorder and check the micro and lead with another recorder. Hints & Tips looked at this problem in June (page 43) and July 1984.

Golem appears to have been good in trying to help, so this might well be the problem.

As for other software, we gave a list of nearly 1000 titles in the May issue, classified by age, subject, computer and price, complete with publishers' addresses. Nick Evans gave more information in July (page 131), but you might try the latest home education titles from Acornsoft, ASK and Mirrorsoft.

Tell me about Teletext

Sir, I have noticed while browsing through Channel 4's Teletext service that there are test pages (on page 597 after the Italian test page and on page 598) for an extended Level 1 teletext decoder and a Level 2 teletext decoder with enhanced facilities – for example, double width and double size text and a black foreground colour.

Our television, which is equipped with, I assume, a Level 1 teletext decoder, decodes these pages as best it can without the extra facilities. I wondered whether it would be possible to upgrade the teletext decoder chip in the Beeb to one of these enchanced chips.

If so, how much would one cost and where would I get one?

Incidentally, how is the area of black background produced when subtitles are superimposed onto a normal television picture?

Ian Goldby
Herts

David Bell of Acorn replies: It is, unfortunately, not feasible to upgrade the Mullard SAA 5050 chip in the BBC micro to one of the newer CCT chips developed for Level 2 or 3 teletext.

One relevant new Mullard chip, the 'Eurorom', is a 40 pin device with a different architecture. Even if it were possible, it would of course introduce potential compatibility problems with the BBC micro's MOS and existing mode 7 software.

The black background for subtitles displayed on a teletext TV is produced by the Teletext Start Box and End Box characters. The SAA 5050 chip has a BLAN output which, in a TV, is used to blank the video signal to create the black background.

Lawson Brown, Editor of the BBC's Telesoftware unit . . . New adapters coming on to the market (eg, the Morley Electronics unit) should be able to cope since they use the appropriate hardware.

Communication breakdown

Sir, After reading the August '85 edition I wondered why *Acorn User* doesn't have a communications system?

You could have the yellow pages listings on it so that they could be down-loaded, plus articles from past issues.

There could be a help box for readers to ask questions for your experts to answer, a 'chat line', and how about a celebrity chat-line like on Micronet?

I am sure the system would be a great help and a hit with all readers.

Jason Palmer
W Yorks

First, we do put some listings from each issue up on Micronet each month, although they are difficult to find (a problem we hope Micronet will soon cure – so send them a 'hurry up' message).

Also, five of us went along to Micronet for a Celebrity Chat-line during the Acorn User Show (which, through a misunderstanding, Micronet forgot to plug, but we still got 50-odd calls).

As for setting up our own system, it's very time-consuming – but we are looking into it (but no promises!).

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CENTRAL PROCESSING...

CENTRAL PROCESSING...

G A Smith, Worcester Park
Micro Power is certainly still in business, though it has reduced its coverage of the BBC micro to concentrate on new machines such as the Amstrad. You can get them on (0532) 45880.

Kevin Munro, Ross-shire
Several people have written in with your problem, whereby they have accidentally saved over the beginning of a Basic program on tape, seemingly losing it forever. There is a way around this, providing that you have a machine code monitor, for instance, Beebugsoft's *Exmon 2*.

The procedure is to *LOAD what remains of the Basic program into memory at a convenient address, eg:

```
*LOAD PROG 2000
```

Using the memory dump option note the address of the very first RETURN character, eg, &0D or 13. Then note the address of the last byte+1 in the file, which will be &FF. *SAVE this section of memory, then you can load and use what you have, adding the 'lost' lines of program.

If you don't have a machine code monitor it would be a simple matter to write a short Basic program that will locate the first &0D and the &FF for you.

Bob Jones, Harlow
Programs written in BBC Basic should, provided they are written 'legally', run on the Electron in most instances. The only exceptions are when the Beeb program makes specific use of hardware – for example there is no mode 7 on the Electron, so teletext screens aren't possible. Certainly there is no difference in the way the PRINT statement works.

A Kitson, BFPO 30
The line numbers associated with GOTOs and GOSUBs are tokenised to allow the Basic Interpreter to translate them much quicker than would be possible if they were stored as an ASCII string. The steps for tokenising the number are: Take four bytes, set the first to &8D, mark the other three, byte 2, byte 3 and byte 4. Convert the line number into a two byte binary value, and mark high and low.
Proceed as follows:

```
byte 1: set to &8D
byte 2: set bits 0 and 1 to 0
        copy bit 7 of low byte
        into bit 3
        invert bit 6 of low byte
        and copy into bit 2
        copy bit 7 of high byte
        into bit 5
        invert bit 6 of high byte
        and copy into bit 4
        set bit 6 and clear bit 7
byte 3: copy bits 0 to 5 of low
        byte into bits 0 to 5
        set bit 6 and clear bit 7
byte 4: copy bits 0 to 5 of high
        byte into bits 0 to 5
        set bit 6 and clear bit 7
```

Detokenising a line number is simple, requiring just a few bytes of machine code, eg:

```
50 ASL byte1: ASL byte 1:
   LDA byte1: AND #&C0
60 EOR byte2: STA &70:
   ASL byte1: ASL byte1
70 EOR byte3: STA &71:
   RTS
```

On exit, &70 and &71 contain the binary value of the line number.

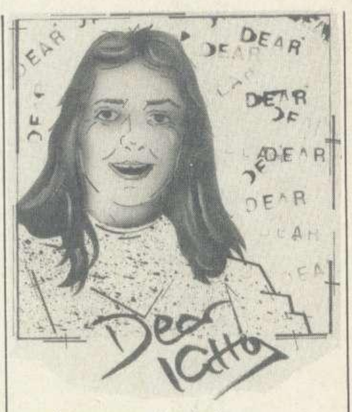
Richard Lesurf, Billericay
I doubt if you could easily transfer Joe Telford's RX and TX programs in the August *Acorn User* to deal with sound. If you want to transmit information through your telephone lines then I suggest you invest in a modem (see August issue also).

J M Phillips, Sheerness
To help you with your choice of DFS/DDFS and disc drives, refer to our special issue on discs, July 1985.

A Wilson, Colchester
If you wish to use more than four ROMs in your BBC micro at once, then the only way you can do this is by purchasing a sideways ROM extension board, such as the Aries B12 board. Alternatively, see 'Expanding in the right direction' in the September 1985 issue of *Acorn User*.

Because of the large amount of technical enquiries we receive in the *Acorn User* office we are now unable to reply to individual letters. However, this new feature is intended to answer as many of your queries as possible, and provide a useful information spot. Please keep your letters short and to the point.

Kitty sets out the pros and cons of word processors



Q My husband has a BBC micro which he uses purely as a hobbyist. I understand, however, that it's possible to add extra items to allow it to be used as a wordprocessor. As a secretary I use a wordprocessor in my work, and I thought if I could add the facility to the BBC micro I could work at home.

Could you advise me which is the best wordprocessor and how difficult it would be to install it?

Isobel New
Sunderland

A Yes, it certainly is possible to turn your home micro into a wordprocessor, and what's more it's very simple.

As you may know, *View* and *Wordwise* are two of the most popular of the wordprocessing packages around: in fact there is a new version of the latter called *Wordwise Plus*, which has many extra facilities – the August issue contained a review of it. Of the two packages *Wordwise Plus* is undoubtedly easier to learn than *View*.

Wordwise Plus is menu driven – when you switch it on it presents you with a title page containing a list of options you can select simply by pressing a single key – load text, save text, search and replace, and so on. When *View* is turned on you are given a blank page with a few details regarding the amount of memory left, and filename of any text present. All loading and saving of text, etc, is performed using appropriate commands that are typed in at the keyboard.

In both cases actual entry of text is done by pressing the Escape key which moves you into the edit mode screen. In *Wordwise Plus* there is only a 40 column mode screen available. Although this is quite clear to read it does not actually show you what your final document looks like. The layout can be viewed by previewing the text in 80 column mode: move back to the menu and press a single key.

With *View* it is possible to work in any of the screen modes of the BBC micro, so by selecting, say, mode 3 you can work directly in 80 column mode so that, to coin a phrase, 'what you see is what you get'. This facility is particularly useful when compiling tables of data. The drawback here is that the text on the screen is smaller and not suitable for prolonged viewing on a TV screen. A monitor, though, will overcome tired eyes.

Special effects, such as italic and underlined text can be obtained by placing embedded or edit commands at the appropriate point in the text. This is straightforward enough in both but somewhat more flexible in *Wordwise Plus*. In this case you can use as many as you like because each effect has a different coding.

In *View*, however, you must use highlight codes, of which there are only two – therefore if you wish to use three different effects in your text you must keep defining and redefining the highlight codes.

Wordprocessing often involves performing repetitive actions on sections of text. In *View* this can be done by setting up a 'macro' which is a sequence of special commands that will work on a specified section of text. *Wordwise Plus* contains a special programming language that's similar to Basic. By writing short programs it's possible to manipulate your text just about any way you want.

In both cases the wordprocessor is supplied as a chip which simply plugs inside your computer. Your local dealer will be happy to fit this.

Some say that *Wordwise Plus* has distinct advantages over *View*, though you might, like me, find *View* easier to use. This is especially true if you're familiar with a professional wordprocessing system at work.

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232 **£25** RS232 + 2K Buffer **£55**
IEEE 488 **£62**



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop.

MICROVITEC

- 1431 – Medium resolution as used on the BBC television computer programme **£185**
- 1451 – High resolution, suitable for word processing in mode 0 .... **£229**
- 1441 – High res, exceeds the capabilities of the BBC micro **£385**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£269**
- Dust Cover for Microvitecs **£5.50**

All Microvitec Monitors are 14" and are supplied complete with cables.

KAGA

- KAGA KX1201G Hi-res Green Monitor **£90**
- KAGA KX1202G Ultra-Hi-Res Green Monitor **£105**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor **£105**
- KAGA Vision 2, Hi-Res, RGB Colour Monitor **£225**
- KAGA Vision 3, Ultra Hi-Res, RGB Monitor **£310**

FIDELITY COLOUR MONITOR

- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen. Supplied complete with cables.

Introductory Offer: **£169**

ZENITH

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too – you can really see the detail that has been put into the graphics **£66**

LEADS

BNC Lead for Zenith or Philips **£3**
RGB lead for KAGA **£3**

N.B. Carriage on Monitors **£7** (securicor)



ROM-SPELL



ROMSPELL is the new fast Spelling Checker ROM from Watford, Packed with excellent features, ROMSPELL is probably the most advanced spelling checker available for the BBC micro.

Features include:

- 30,000 word dictionary
- One pass check
- Two pass check
- Ambiguous word check
- Basic access to ROMSPELL
- Immediate entry check

ROMSPELL is fantastic value at **£23**

(Please specify 40 or 80 tracks when ordering)

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE
BBC Model B, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 400k Epson drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer. Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc. 10 × 3M disc, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

NEW LOW PRICE

Only £999



CREDIT CARDS
24 HOUR HOT LINES
ACCESS 0923 50234
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THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

This book is superb value at only
£5.95 (Book – No VAT)



This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see elsewhere in this ad).

Only **£23**
(For software on disc please add £2)

ALFRED ROBOT SYSTEM

Designed specifically to teach the principles of Robotics, the Alfred Robot system is priced for the hobbiest pocket.

Alfred is controlled by your computer via the User Port (or similar port) and can be programmed to perform complex movements with 5 different axes of revolution.

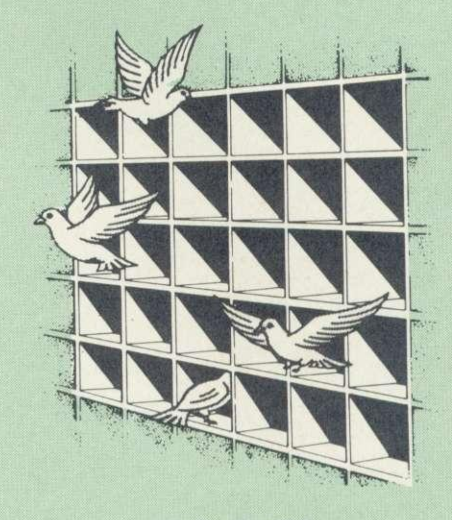
A full circuit diagram and detailed fitting notes are supplied with Alfred.

Complete software packages are also available to utilise the potential of the Alfred Robot System.

Lifting capacity of 110gms. External requirements: 9v-12v 2 amp DC power supply.

Price £195

DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £17**
(Please specify 40 or 80 track when ordering)
(Please write in for technical specifications)

FILE-PLUS

File-Plus is a powerful database for the BBC micro with many advanced features. Largely menu driven, File-Plus is provided on a 16k ROM with some extra utilities on disc. Features included are detailed below:

- Flexible full screen form layout.
- Built in File Query Language (FQL).
- Printer Output.
- Arithmetic operations in FQL.
- Looping in FQL.
- Number range of +– 9999999999.9999.
- File linking allows files over different drives.
- Multiple forms allow selection of displayed data.

Only £36
(Please specify 40T or 80T disc

DATAGEM
Gemini's 24K ROM based DATABASE Management System
Special Offer: **£69**

Continued →

NEW LAUNCH

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple *COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *BT Approval applied for.*

Launch Price: Only **£89** (carr £3)

(Price includes Software ROM, Cables and Manual)

NEW LAUNCH

The Watford ROM/RAM CARD
A must for all serious users

We, at Watford Electronics, have been producing high quality hardware and software products for the BBC for three years now. Having carefully observed the needs of our customers we set our top hardware engineer the task of producing the ultimate ROM board to meet all your ROM/RAM requirements.

After weeks of top secret development we are now able to bring you more details of this, the ultimate in ROM/RAM boards.

● No overheating problems. ● No User Port corruption. ● Full buffering. ● NO SOLDERING. ● No flying leads. ● Firmly mounted. ● Easy fitting. ● Up to 8 banks of 16k of Dynamic RAM. ● One bank of 16k CMOS Static RAM allowed. ● All RAM has Write protect. ● All RAM has Read protect. ● CMOS RAM can have battery backup. ● Special RAM write register. ● Can run any BBC ROM. ● FREE utilities disc. ● Compatible with DDFS boards. ● Compatible with our 32k RAM Card. ● Compatible with our Sideways ZIF. ● Large printer buffer (up to 128k) ● High speed disc backup via RAM.

Obviously, so much RAM requires some powerful facilities to use. To show you just how powerful the features our board offers are, and to convince you that the competition if any, is just simply not worth buying, we shall provide some more details on the advanced features offered.

Each socket has write protection to allow all ROM based software to be run. Also, to help during software development, each socket is equipped with a special read protect facility (this allows recovery from ROM crashes). Up to 8 ROMs and 8 banks (each of 16k) of RAM may be used, or one of the ROMs may be configured to give 16k of battery backed CMOS Static RAM.

The RAM socket selection (which is independent of the normal ROM socket) is performed by a special register at &FF30. In normal systems, a "write" to this location would have no effect. We believe that there is available an inferior board in which, for some totally unexplained reason, the User Port (as used by the AMX Mouse, Eprom Programmers, etc.) is used for the selection. Obviously this was not a very sensible move on the part of this manufacturer.

The ROM/RAM card from Watford represents second generation ROM board technology and is a must for all serious users of the BBC Micro.

Please write in for technical details and further prices.

INTRODUCTORY PRICES:

- ROM/RAM CARD with 32K Dynamic RAM **£45**
- ROM/RAM CARD with 64K Dynamic RAM **£69**
- ROM/RAM CARD with a massive 128K RAM **£109**

OPTIONAL EXTRAS:

- 16K Plug-in STATIC RAM **£14**
- Battery for Battery Backup on Static RAM **£2**

The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)
To celebrate the occasion, we are offering Watford's complete Disc Interface Kit at only £65 and the Double Density Unit at £66.

Just compare the features:

Features	Acorn 1.20	Watford Single Density	Watford Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20 partial	1.42 Yes	1.52 Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for two years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£65**
- *Acorn's DFS Kit complete* **£70**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£66**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Quality Disc Drives from Watford Electronics

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them. Users of Acorn's DFS will find that they need to pay the extra for switchable drives if they wish to use 40 track discs in an 80 track drive.

The drives we supply are fast (3ms track to track, 15ms settle), quiet and have a low power consumption (average well under 1 amp). Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.

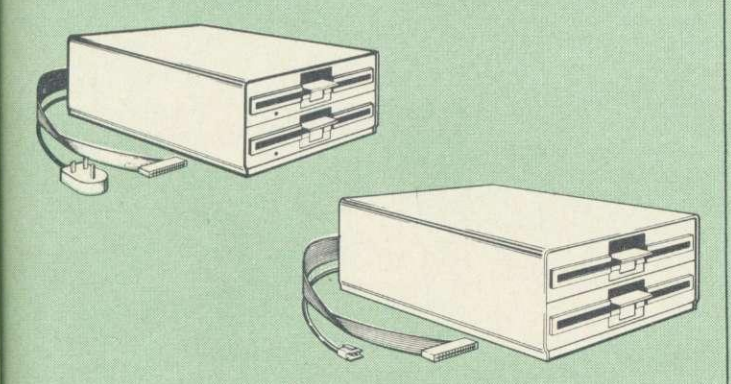
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

Names you can trust, at prices you can afford!

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

All disc drives advertised here will operate in double density mode with the appropriate interface and software.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS100 £82		CS100 £105	
200K (360K)	CLS 200 £84	CLD200 £162	CS 200 £107	CD200 £172
400K (720K)	CLS 400 £110 / £115 CLS400S	CLD 400 £162	£130 CS 400S	CD400 £175
800K (1.44M)		CLD800 £220 / £230 CLD 800S		£235 CD 800S

- TWIN drive CASE, with Power Supply & Cables **£35**
  Securicor carriage on Disc Drives £5

Prefix C = Cased Drive
L = Less PSU
S = Single
D = Double

Suffix S = 40/80 Switchable

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES OF DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – 5¼" DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × S/S D/D 40 Track Diskettes* **£13**
- *10 × D/S D/D 40 Track Diskettes* **£18**
- *10 × S/S D/D 80 Track Diskettes* **£22**
- *10 × D/S D/D 80 Track Diskettes* **£24**

QUALITY 5¼" DISKETTES at KNOCK DOWN PRICES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs, each with a life-time guarantee. These are supplied packaged in an attractive plastic library disc box to protect them from damage.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£11**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£15**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£20**

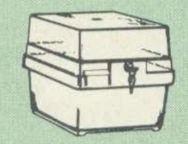
DISC ALBUMS

Attractively finished in beige leather-look vinyl, these conveniently store upto 20 Discs. Each Disc can easily be seen through the clear view pockets.

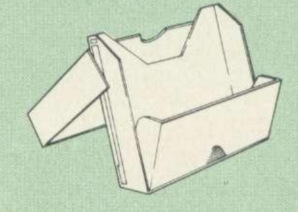
£4.25

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



M35 - holds upto 40 discs **£10**
M85 – holds upto 95 discs **£12**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.25** Twin (with PSU) **£3.90**



EPSON NLQ ROM
for the BBC Micro

Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £22

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00



THE NLQ DESIGNER

The Kaga Taxan KP810 and KP910 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on.

A 40/80 track format disc containing 3 example fonts is included in the package.

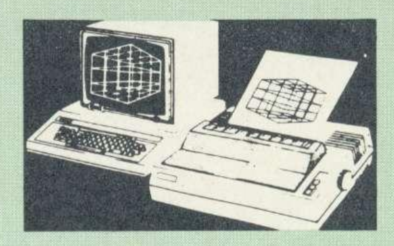
(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

NLQ DESIGNER & FONT DISC **£25**

INDIVIDUAL Preprogrammed FONT ROMS
£15

(Please write in for further details on both the NLQ DESIGNER and the individual font ROMs available.)

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £24 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers: CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/120/200/400, etc. etc.
Price including comprehensive manual

£24

VIEW

VIEW WORDPROCESSOR
We are supplying the new VIEW version 2.1 allowing printing of memory contents etc **£46**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft) £49

VIEWSTORE £52

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £9

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS
Only £8

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 EB 50 and converted typewriters EX43/44 & 55.

Only: £8

BEEB PRINTER ROM



"Makes Printing Childs Play"

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

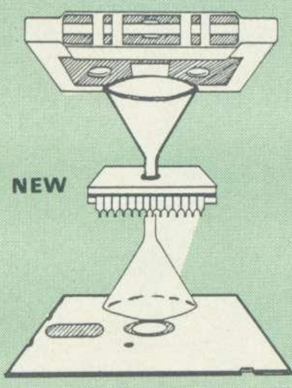
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

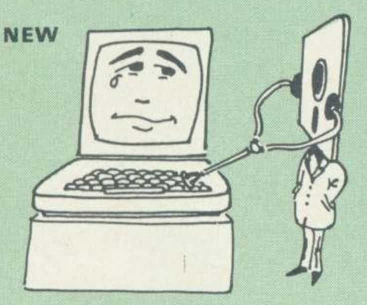
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£22.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £18.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!



ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£43**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.
Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

£24

DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

ONLY **£16**

Please write in for technical details.

ROM MANAGER

Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

Price **£20**

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10** (40 or 80 track)

SPOIL-SPORT ROM

BANISH GAMES . . . DEVELOP BRAINS
Is it that all too often your BBC Micro is being used to stage intagalatic war? Would you rather it was put to a better use?
The answer is now simple. Fit a WATFORD SPOIL-SPORT ROM.

It will:
- Stop machine code games being played on your BBC MICRO.
- Promote serious BASIC programming.
- Allow you to 'UNLOCK' your micro only with a preprogrammed password (in ROM).
- Interface with both disc or tape based micros.

Only £20

(Please specify password required when ordering.)

SPARK DUMP ROM

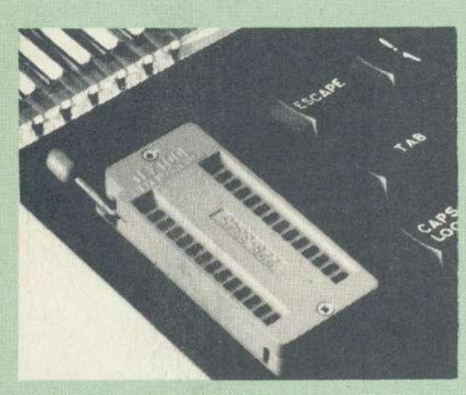
A screen Dump ROM for the Acorn/Olivetti Spark jet printers. Works in modes 0/1/2/4/5/7. Does vertical & Horizontal scaling. Positive & Negative grey scaling.

Only: **£12**

CLARE's SOFTWARE

BROM ROM	£29
BROM DISC	£23
BETA ACCOUNTS PACK	£21

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.
- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15**

NEW

16K Sideways RAM Modules

The revolutionary design RAM Module you've been waiting for! Write and Read protectable, with optional battery backup. Works in a standard BBC micro or one with a ROM board.

Just look at the features:

- Compact construction.
- Fit multiple units with ease.
- No overloading problems.
- Free utilities software supplied on disc.
- Works with any ROM.
- Ideal for professional software development.
- Can be used as a 16k printer buffer as well.
- Load ROMs as needed – no messy unplugging, etc.

Introductory price: **£29**

Optional extras

BATTERY BACKUP £3
READ and WRITE protect Switches £2

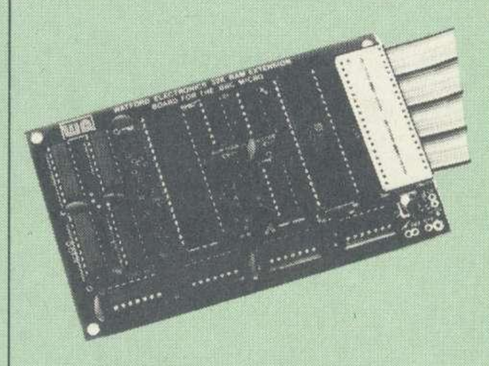
(Supplied already fitted if ordered with the Module)

LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

32K RAM-
PRINTER BUFFER
EXPANSION BOARD



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- In "VIEW", type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc).
- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Offer price

Only: £60

(Price includes a comprehensive manual and the ROM)

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£86**

Nightingale Modem

SPECIAL PRICE to our Customers

£119

(Price includes COMMSTAR ROM & comprehensive manuals)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

BEEBFONT ROM

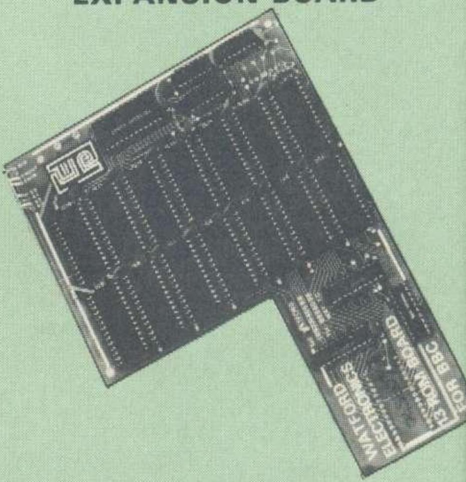
BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in 13 different styles:

A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY **£25**

(Please write in for technical details)

Mk-2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead).

Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the board meets or exceeds all timings for operation in the BBC Microcomputer.

Supplied ready-built and tested complete with fitting instructions.

Only £30

PCB NI-CAD Battery for ROM Boards.

£2

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28
INTER-SHEET	£48
INTERCHART	38
TERMI	£27
COMMUNICATOR	£58
SPEECH ROM	£25

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER: **£32**

WORDWISE PLUS

FREE this month, the superb Word-Aid ROM with every package of Wordwise Plus bought from us **£47**

WORDWISE PLUS UPGRADES

Existing users of Wordwise can upgrade to WORDWISE + for **£19.** Please return the old WORDWISE package complete with Chip and MANUAL with your remittance and we will send you the new WORDWISE + package.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Take advantage of the programming language in Wordwise-Plus. Simply load the disc with Shift-Break and have the power of these sophisticated new features instantly at your fingertips.

Features:

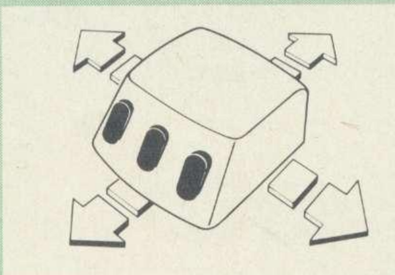
- Mail Merger
  - Can use Data files spooled from Wordwise-Plus.
  - Can use Data files from most databases.
  - Powerful Label printing facilities.
  - Mail merges with names, addresses etc. inserted into a standard letter.
- Address Finder
  - Search for names.
  - Search for addresses.
  - Insert names into text.
  - Insert addresses into text.
- Print/Preview continuous files.
- Chapter Marker.
- Search and Display.
- Remove embedded commands.
- Text transfer.
- Printer Codes – make embedding commands easier.
- Utilities supplied compressed for speed.
- Utilities supplied anotated for help.
- Supplied on 40/80 format disc.
- Very user friendly.
- Recommended by Computer Concept.

Introductory Offer: **£12**

(Further details available on request SAE, please).

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



ONLY: £67.95

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

AMX Desk package	£19.00
AMX UTILITY package	£11.50

COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really bring those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Special Offer: **£10** (£7 carr.)

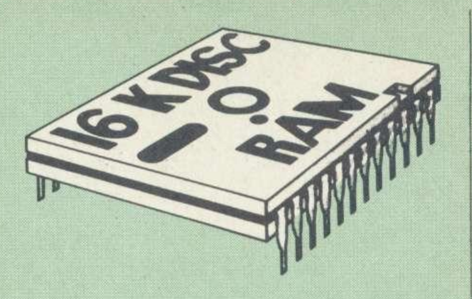
(please specify 40 or 80 track disc when ordering)

PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)



This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32

In recognition of the plight of the starving Ethiopians, Watford Electronics has decided that 10% of the proceeds from its new launch product, Word-Aid, should be donated to the Band-Aid Appeal Fund. It is hoped that this gesture of goodwill and friendship will be followed by more members of the Software/Hardware industry.



BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
100 Programs for BBC Micro	£6.95
6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£19.95
6502 Machine code for Humans	£7.95
68000 Assembly Lang. Programming	£19
A young persons guide to BBC Basic	£4.50
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
Applied Assembly Lang. for BBC	£7.95
Assembler Routines for the 6502	£**XXX**
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Programming made Easy	£5.95
Basic ROM User Guide	£9.95
BBC BASIC for Beginners	£7.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Machine Code Portfolio	£7.95
BBC MICRO add on guide	£6.95
BBC Micro An Expert Guide	£6.95
BBC Micro Assembly Language	£7.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Games Master	£5.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro ROM Book	£9.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Revealed	£6.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
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BBC Wargaming	£8.95
Basic Programming on BBC Micro	£5.95
BCPL User Guide	£15
Brain teasers for BBC micro	£5.95
Business Applications on BBC	£7.95
Computing for All the Family	£6.45
CP/M Bible	£16.00
CP/M Handbook with MPM	£13.95
CP/M Soul of	£14.95
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£7.95
Disc System for the BBC	£6.95
Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
Easy Programming for the BBC Micro	£5.95
Electron Machine Code for Beginners	£6.95
Exploiting BBC Basic	£6.95
Exploring FORTH	£6.95
Filing System & Databases	£7.95
Further Prog. for BBC Micro	£5.95
FORTH on the BBC Micro	£7.95
Forth Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Play	£6.95
Getting more from your BBC & Electron	£6.95
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Graphs & Charts on BBC Micro	£7.50
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Handbook of Procedure & Functions for the BBC Micro	£6.95
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Introducing LOGO	£5.95
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LISP Cassette	£15.50
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£16.50
Programming the 6502	£13.95
Programming the BBC micro	£6.95
Programming the Z80	£16.95
Programming with Graphics	£5.95
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£6.95

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Features offered by this package include:

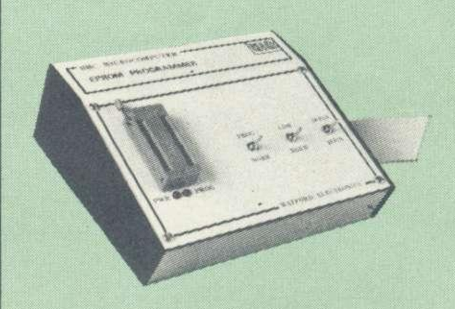
- The adding of pictures or written text to typed documents.
- Unattended recording of scientific data.
- Entry of real images into graphics programs.
- Generation of computer images.
- Slow scan television; sending images via a modem or radio.
- Security.
- Input from any video 1v video source.
- Full resolution in Modes 0,1 or 2.
- 1.6 seconds scan time.
- Up to 8 grey levels
- Manual or Auto level control
- Connects to user port

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£95 (Carr. £3)

(Price includes: Digitiser Unit, ROM & a comprehensive Manual.)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69
(£3 carr.)

LOW COST 'DIN' EPROM PROGRAMMER

A high performance, low cost, self contained 'DIN' EPROM PROGRAMMER for the BBC Micro. Plugs into the BBC Micro's user port.

The features are:

- Will program 2716, 2732, 2532, 2764 &

27128 EPROMs.
- Copy Eprom into memory and compute checksum.
- Blank check EPROM.
- Program EPROM from memory.
- Verify programmed EPROM and display checksum.
- All * commands may be used from menu mode.
- High speed programming on 2764 & 27128.
- Machine code SOFTWARE supplied in ROM.

Only: **£49.50** (carr. £2)

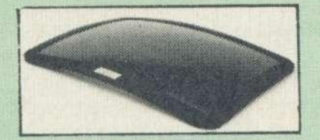
TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.
- **ERASER EB** – Standard version erases up to 16 chips. **£28**
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30**
- Spare UV tubes. **£9**

VOLTMACE

DELTA-14 JOYSTICK	**£12**
Adaptor Module	**£12**
Transfer Software	**£7**

ANTI GLARE MONITOR SAFETY SCREEN



HEADACHES? TIRED EYES? Don't take pills – Use a Watford Electronics anti-glare filter!
- Made in Britain by a long established glass maker.

Available in 12" & 14" versions – please specify the exact monitor type when ordering.

Special Price: **£13.00** (carr. £2)

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£9.50**

FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

£4

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£11** (£2 carr.)

DATA RECORDER

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter. **£20**

DATA CABLE to connect recorder to BBC **£2.00**

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**

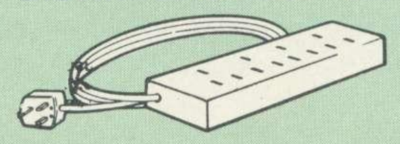
DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.99




CREDIT CARDS 24 HOUR HOT LINES
ACCESS 0923 50234
VISA 0923 33383

SPARES for BBC Micro

Keyboard	£46;	Keystrip	£2
Power Supply	£45;	Case	£25
UHF Modulator	£4;	Speaker	£2
Speaker Grill	£1;	Keyswitch	£2

28 pin ZIF SOCKET (Textool) **£6.95**

28pin DIL HEADER PLUG

SOLDER type	£1.50
IDC CRIMP type	£1.95

RIBBON CABLE

28way **55p/ft.**; 34way **60p/ft.**

8way DIP SWITCH **£0.85**

CHIP SHOP

7438	40p;	74LS00	25p
74LS04	25p;	74LS10	25p
74LS123	80p;	74LS163	70p
74LS244	80p;	74LS245	£1
74LS393	£1.20;	4013	60p
4020	£0.90	4816	£1.00
DS3691	£3.50	DS88LS120	£3.00
LM324	£0.45	UPD7002	£4.40
6502A CPU	£5	65C02 CPU	£9.50
6522	£3.40	6845SP	£6.75
SAA5050	£8.75	SN76489	£5.50
2764-250nS	£2.40	27128-250nS	£3.90
6116LP-2K	£2.75	6264LP-8K	£5.60
8271	£45	ACORN DNFS	£15
ACORN OS 1.2	£6	ACORN BASIC 2	£16

ACORN LOGO **£60** COMAL **£43**
ISO PASCAL **£60**
SLEUTH ROM **£25** TOOLKIT ROM **£23**
BBC A to B Upgrade Kit **£45**

NEW LAUNCH

DELTA CARD

Delta is the latest in add-ons for the BBC Micro. Mounting internally, this unit provides a new CPU to run your programs at TWICE their original speed (i.e. a massive 4 MHz!). Even better than this, you can run applications programs such as Wordwise Plus, ViewSheet, Pascal, etc. at twice their speed. Whereas a 6502 Second Processor increases the speed of a standard BBC by about 50%, the combination of a BBC and Delta Card runs at twice the speed of a standard BBC! Unlike second processors, full compatibility is achieved with all standard software.

64k of fast RAM is provided on this card to allow for your program, Basic and the Operating System to all be stored in fast RAM, and hence run at maximum speed. Software available for this unique and powerful expansion card includes routines to load the currently selected language into the 16k of fast sideways RAM, alter the banking of the RAM to provide 'shadow' screen memory (as featured in our 32k RAM Card), provide a printer buffer, edit memory, etc.

Special Introductory Price
Only £99 (carr £3)

ACORN SPEECH SYNTHESIZER

Speech Chips, Manual and full fitting instructions

Only £19

Prices subject to change without notice and available on request.
MAIL ORDER AND RETAIL SHOP TRADE AND EXPORT INQUIRIES WELCOME. GOVERNMENT AND EDUCATIONAL ESTABLISHMENTS OFFICIAL ORDERS ACCEPTED.
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Credit Card Orders TEL: ACCESS (0923) 50234 VISA (0923) 33383
Telex: 8956095 WAELEC

THIS IS NOT A SIDEWAYS RAM ADVERTISEMENT!!

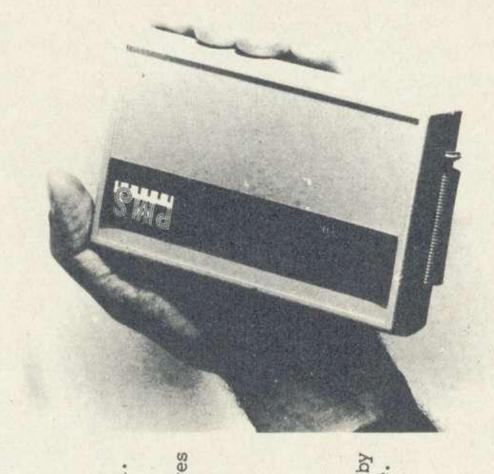
NEW LAUNCH

NEW LAUNCH

64K NON - VOLATILE RAM MODULE

Add a massive 64K of battery backed - up RAM to your BBC B or B+
This is no ordinary memory expansion!

FEATURING:



* SIMPLE

The module is external to the BBC.
Absolutely NO SOLDERING required.
No need to open the case to install.
Simply plugs into the 1MHz bus.
No unplugging of chips, cutting tracks, moving links, attaching wires to IC legs...

* PORTABLE

Totally self-contained unit.
Small enough to slip into a pocket.
Rugged construction.
Memory contents retained for YEARS by internal re-chargeable power source.

* VERSATILE

Unlimited Uses - eg:
Portable Ram-Disk
63K Printer Buffer
Desk Diary
Fast Data Storage/Retrieval
CAL Systems
Overlay Storage for Mammoth Programs
Screen Storage for Windows.

WOT! - could you do with 64K extra on your BBC?

The Ram Module comes complete with SOFTWARE and COMPREHENSIVE MANUAL for only £129.95 (excl. VAT and £2 p&p). The software is supplied on a dual format disk - if tape required please specify.

To order your Ram Module, send a cheque for £151.75 (all inclusive) to:

PERMANENT MEMORY SYSTEMS,
38 MT. CAMERON DRIVE NORTH,
EAST KILBRIDE, G74 2ES

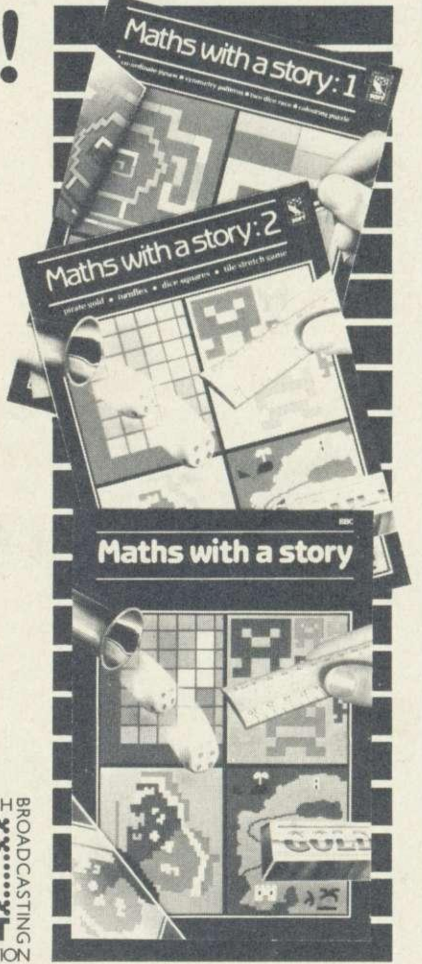
For more information, write or phone (03552) 32796.

Official orders and inquiries from Government Establishments, Universities, Colleges, Schools and Hospitals welcome.

Permanent Memory Systems is the trading name of Ganarch Limited.

MATHS CAN BE FUN!

These delightful maths packages for the BBC Model B or Electron are based on the highly-acclaimed BBC Radio series for primary schools. They feature a friendly approach, careful matching to a child's level of understanding, and superb screen presentation, bringing maths topics alive in an exuberant and entertaining way.



Maths with a Story 1

Co-ordinate Jigsaw–an imaginative introduction to co-ordinates. Symmetry Patterns–a powerful idea that children can directly explore. The Two Dice Race Game–elementary probability introduced through participation. The Colouring Puzzle–the famous map-colouring problem, whose presentation here is proof that mathematics really is fun!

BBC Model B version: Cassette and booklet £10.95 0563 211253

Electron version: Cassette and booklet £10.95 0563 211512

Maths with a Story 2

Pirate Gold: A treasure hunt for one or two players using co-ordinates and logic. Rotaflex: Symmetry–rotations and reflections–through picture design. Dice Squares: Probability and number bonds–two variety-filled games based on dice throwing. The Tile Stretch Game: Stretch, enlargement, distortion, area–cover a board with tiles after stretching them.

BBC Model B version: Cassette and booklet £10.95 0563 211458

Electron version: Cassette and booklet £10.95 0563 211520

Maths with a Story–Book

In this entertaining, fully illustrated book Shirley Stewart presents a wide range of enjoyable maths projects and activities for all the family. The topics include tessellation, maxima and minima, fractions and remainders, and numbers in everyday life.

£4.50 0563 211768



Prices include VAT. Available from software dealers and major booksellers, or by post from BBC Publications P.O. Box 234, London SE1 3TH. (Add £1.30 for postage and packing.)

BRITISH BROADCASTING CORPORATION
BROADCASTING SOFT

SPLASH IT ALL OVER ELECTRONICALLY

Chris Steele draws up *Freehand*, an art package to rival those found in design studios

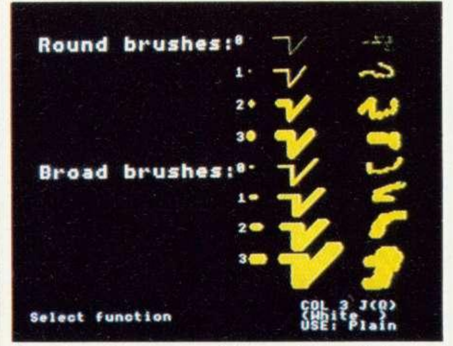
THE computer fascinates many who would like to experiment with it while not wanting to learn to program – usually it is the graphics and sound capabilities that arouse most interest. Unfortunately the tortuous actions required to get just a simple splash of colour on the screen put off many potential users before they have even started.

Freehand is a 'painting' system which allows you to put colour on the screen in a familiar way, and then manipulate it with a number of tools usually only available on the costly commercial systems found in large design studios.

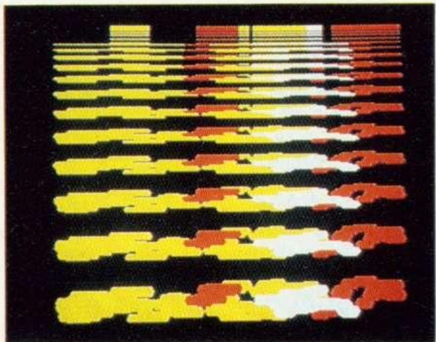
People are often confused by painting systems and CAD (Computer Aided Design) systems. The difference between them is that a painting system manipulates and works upon the screen image itself, while a CAD system works upon data which represents an actual or imaginary object – the screen displays just one interpretation of that data. With a painting system the screen image is often the end product, while with a CAD system the final product is more likely to be a design for a house, car or shoe.

Freehand offers a variety of electronic brush styles for making the initial marks on the screen – there is an airbrush, a text plotting routine, patterns and a broad pen. Once an image has been created there are many routines for manipulating it – it can be squashed, stretched, twisted, copied, blurred or mapped as you desire.

The software was originally developed for use by art and design students. The way they used it was as unexpected as the screen images they produced. Often, while trying to produce an image, a student would accidentally create something more interesting. Others used the software as an investigative tool, then returned to paper or canvas to produce the final article they envisaged.



Freehand **puts a wide variety of brush-strokes at your disposal**



Once an image has been created it can be stretched and squashed



There are many effects available for you to build up your own images

This month I'll introduce the central program which includes the basic brush styles and general utilities. In the November issue I'll present the routines used to produce the illustrations on these pages.

The software comes in a number of parts which are saved on disc. The first, "PAINT", is a header program which sets up the system variables, initialises some text data and defines the brush characters.

It then loads the main program "P2" which contains a kernel of I/O routines and the basic brush and line drawing facilities. Other routines are called from P2 as disc overlays when they are needed.

There is no theoretical limit to the final total size of the software, but this program has just 14 overlays.

Typing it in

First type in the "PAINT" program and save it. It sets up the mode 1 screen, defines the graphics window and a text window for prompts, sets the function keys to produce ASCII values 200-229, sets the A/D converter to do eight bit conversion and disables the auto repeat on the keyboard.

Next type in "P2" and save it as such: it is chained from "PAINT". The box on page 66 tells you what the various bits do.

Next type in and save "O.SHUTILS", save it in directory O (for Overlay) under the name SHUTILS. This will be loaded when either f0, f1 or f2 are pressed in conjunction with Shift.

Finally, you type in and save "O.CTUTILS". Save it in directory O under the name CTUTILS. This will be

loaded whenever f0, f1 or f2 are pressed with the Control key.

Getting started

Now you are ready to splash some electronic paint onto your VDU. Chain the first program "PAINT". Once P2 has been loaded you'll see a blank graphics window, and a text window for prompts taking up the bottom three lines. To the left are the words 'Select function', and to the right is a status box showing which colour number is in use, the colour that number represents and how the colour will be used. K will appear if the keyboard is selected or J for the joystick, followed by S if the slow but steady joystick routine is in use, or Q if the quick but rather inaccurate method is chosen.

Select a brush with f5 or f6, then a cursor will appear, and the prompt line tells you which brush has been chosen. If the cursor does not appear at first try moving it about. Now, by pressing the fire button (or the space bar if the keyboard is selected) the brush will leave its mark on the screen – I'll call this action a 'Hit'. Try different combinations of colour, colour use and brushes. Key f8 allows you to change from quick joystick to slow joystick to keyboard. Key f7 performs 'rubber banding' – one hit to fix the first point, drag the line around the screen and hit again to fix the other end – select another function to quit. Key f9 clears the graphics screen to the colour currently in use.

A grid function helps you position images more accurately. Press Tab once to show the grid, then again to erase it. This will only work from another function and when the cursor is on the screen. It is best to turn the grid on, position the cursor, then turn it off again before you make any marks, otherwise occasional pixels may be left in the wrong colour.

Pressing Shift and f0 will load O.SHUTILS (for Shift UTILitieS), then erase the prompts box and move the graphics screen down by a couple of lines which is useful for taking screen shots. Press any key to return to the main program.

Shift and f1 redefine the colour in use. Move left or right and the colour will be changed on screen, then its name will appear in the status box. Hit to fix the colour.

The last utility in SHUTILS redefines the size and position of the grid. Move the cross hairs to the bottom left-hand corner of a new grid square, hit, then move to the upper right and hit again. The cross hairs will disappear and the grid will be displayed.

Loading the CTUTILS (for ConTrol UTILitieS) overlay by pressing f0, f1 or f2 in conjunction with the Control key will allow you to save or load a screen from disc, and perform operating system commands (*FX, *DELETE, *DRIVE, etc).

The screen memory is saved in directory P (for Picture), while the pallette information is saved under directory C (for Colour). This allows the software to reset the pallette to the colours in force when you last saved that picture. When performing OS commands which produce some form of output to the screen (*CAT or *INFO) that output will be printed on the graphics screen, so make sure you've saved any image that you wish to keep before executing those commands.

Finally, people get most benefit from the software by playing with it. I have given up trying to predict how people will use it, as they always find a way I had not thought of, and something quite extraordinary appears – unlike anything they were aiming at!

The program was developed to run on a BBC B (OS 1.20 and Basic 1) with double-sided 80-track disc drive. But don't despair if this is not your set-up as there are a number of ways in which the software can be adapted.

For single-sided or single-density discs the software should work fine, but I recommend you keep a separate disc for screens you have saved as each of these screens uses two files of over 20k in length.

You can also adapt the program to

How the program works

Lines 60-70 reserve space for the overlays – each should be less than &700 long.

Line 80 sets the error trap, which will display the error number and allow you to re-run the program while keeping the graphics screen intact.

Lines 110-150 form the main loop – 'updatek' allows the user to select a function, then 'select' directs the program to the correct code. Unfortunately because BBC Basic performs no garbage collection the program will run out of variable storage very quickly once a few overlays have been used. To solve this problem a CLEAR is performed after each function, so the end of the main loop has to be terminated with a GOTO. CLEAR clears all variables including the Basic stacks.

PROCselect determines which function routine is to be used. If the function key is pressed with either the Shift or Control key then an overlay will be loaded from disc.

Lines 300-330 select colour numbers 0 to 3 respectively.

Lines 350-420 increment the way in which the colour should be used; plain, OR, AND, EOR, or invert (see page 262 of the User Guide).

Lines 390-420 increment the brush number. There are four round brushes: 0 is a single pixel while 3 is the size of a character space.

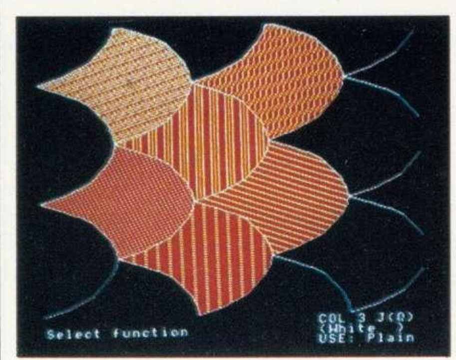
Lines 440-470 select a broad brush. Again there are four: 0 is just a couple of pixels wide while 3 is two character spaces wide.

Lines 490-580 allow 'rubber band' drawing.

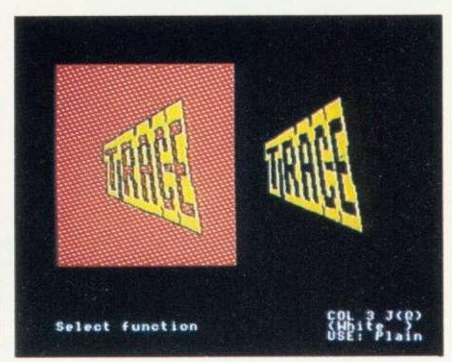
Lines 750-780 change the input routine which is used. PROCstick uses joystick number one. PROCavstick takes five values from PROCstick and averages them to give a steadier cursor, and PROCkeys uses the cursor keys.

Lines 800-810 clear the graphics screen to the present screen colour.

No, it's not your eyesight that's at fault – this is an example of the blur routine



Just some of the many patterns you can incorporate in your pictures



Another option allows you to copy an image to achieve what you have in mind

run on a cassette-based system – see the notes on the yellow pages for details of how to do this.

Readers with second processors should set PAGE to &1900 before you start.

All requests for co-ordinate information go through PROCcoords, and are then sent to PROCkeys, PROCstick or PROCavstick. There should be no problem replacing one of these procedures with one of your own to request information from another device. The requirements are that the procedure returns a value in X% and Y% within the screen boundaries, and sets hit% to TRUE if the button has been pressed.

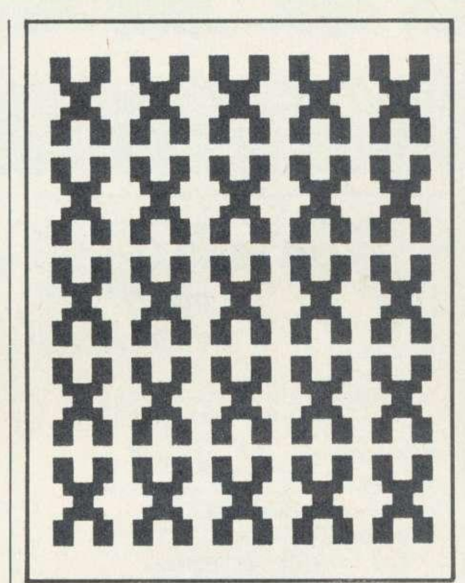
The *Freehand* listings are on yellow pages 97–100

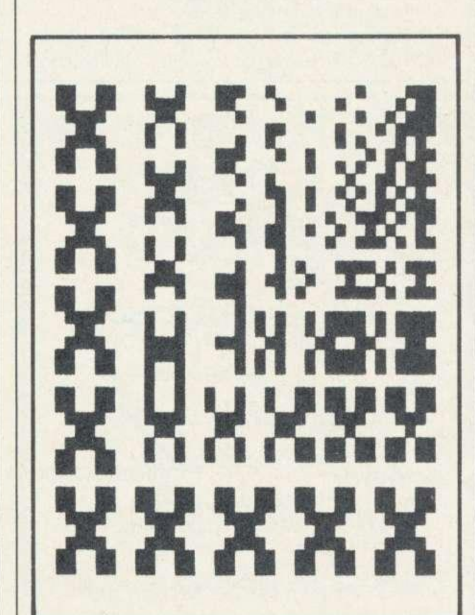
f0 Selects colour 0 (black initially)
f1 Selects colour 1 (red initially)
f2 Selects colour 2 (yellow initially)
f3 Selects colour 3 (white initially)
f4 Changes the way the colour will be used
f5 Selects one of four round brushes
f6 Selects one of four broad brushes
f7 Rubber band lines
f8 Selects keyboard or joystick
f9 Clears the graphics screen
Shift f0 Centres the graphics screen
Shift f1 Redefines the present colour
Shift f2 Redefines the grid
Control f0 Saves the present screen
Control f1 Allows OS (*FX) commands to be input
Control f2 Loads a screen from disc

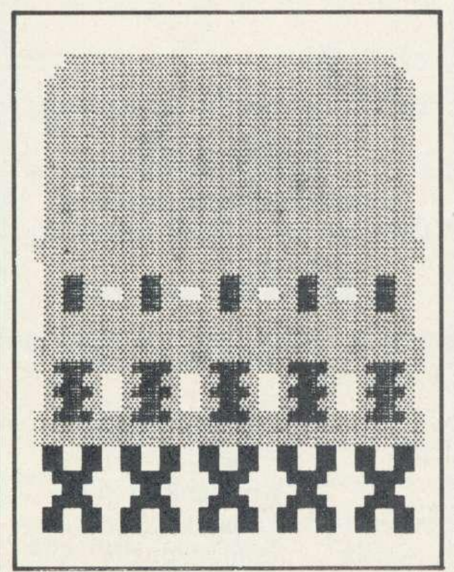
Other keys

Tab Displays or erases grid
Escape Aborts present function
Cursor keys Move cursor
+ **Shift** Move the cursor in big steps
Space bar 'Hit' equivalent of joystick button

Find your way round fast with this quick reference guide to what the function keys do







Three examples of what you can 'paint' with *Freehand*

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SHIFT	POSE	DEF COL	DEF GRID							
	COL 0	COL 1	COL 2	COL 3	COL USE	BR 0-3	BBR 0-3	BAND	JOY/KEY	CLR SCR

Cut out or trace this function keystrip to help you use *Freehand*

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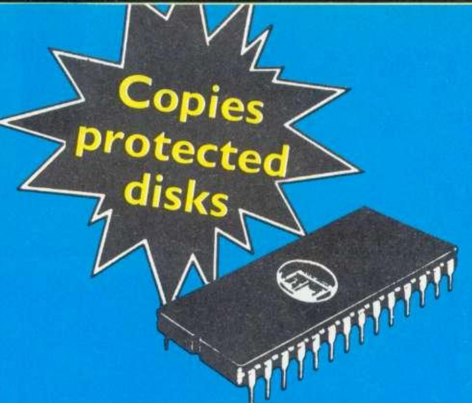
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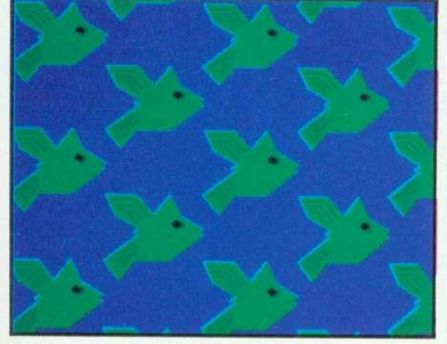
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STYLISH SYMMETRY

Jim McGregor and Alan Watt turn their micros to designing wallpaper-type repetitive patterns

PATTERNS for decoration come in all shapes and sizes, but many of them make use of the phenomenon of symmetry, where a part of a shape or pattern is repeated in a certain way. The theme of symmetry runs right through history, from the wallpaintings of the ancient Egyptians to the carpets and wallpapers of today. It allows the designer to take a shape, or motif, and repeat it so as to cover a large area.



Asymmetrical flying fish display illustrates network pattern 1 in figure 4

The shape may be simple or complex; it is the way it is repeated which is the focus of this article.

It turns out there are just 17 possible ways to arrange the basic motif so the final 'wallpaper'-type pattern exhibits certain kinds of symmetry. These can all be described mathematically, and so can be reproduced by a BBC micro or Electron. Great skill is needed to visualise and reproduce these patterns, but the micro can do it easily, leaving us to work on the effects of shapes displayed with certain symmetries.

type	distinguishes motif type
xx	x axis origin position of motif
yy	y axis origin position of motif
skew	a distance through which to translate motifs in certain rows
PROCdraw-motifat	draws a motif using origin (xx,yy)
point	loop counter for points of motif
plotop	plotting operation
x	x axis position of a point of the motif relative to the origin (xx,yy)
y	y axis position of a point of the motif relative to the origin (xx,yy)
PROC-transform	transforms the points of a motif, ie, rotation, reflection, etc

Table 1. Definitions of the variables used in all the programs

The yellow pages present 17 programs to reproduce the wallpaper patterns. A simple triangle motif is used to demonstrate, but this can be replaced by a shape of your choice which is plotted, input by a digitiser, or calculated mathematically. The only limit is that of your imagination – illustrated by the two final listings using data for a rhino and a daffodil!

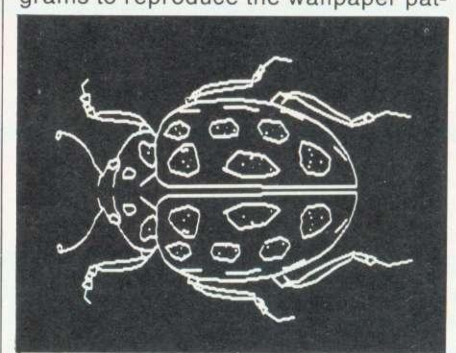


Figure 1. Beetle shows mirror symmetry about a line running from its head down

Types of symmetry

There are two fundamental types of symmetry, the first of which is very well represented in nature. Take the



Two Koch flakes used in network 17. This network has 60° rotational symmetry centres and lines of reflection. (a) and (b) are the same pattern with VDU19 changes. The same goes for (c) and (d)

example of the beetle in figure 1, which shows 'mirror' symmetry. In other words, one half is the reflection of the other. Most animals and insects are the same. This type of symmetry can be detected by folding a drawing of the object in half: if one half fits perfectly over the other, it is symmetrical about the line of the fold.

The second kind of symmetry is demonstrated by figure 2. Note that there is no line about which the seahorse star can be folded to show mirror symmetry. However, it can be turned about the axis line through its centre so that one arm sits perfectly over the next. This is 'axial' symmetry. The beetle in figure 1 has no axial symmetry. Figures with neither mirror nor axial attributes are asymmetrical.

Program organisation

The programs that control the arrangement of each of the 17 wallpaper groups are given as listings 1–17 on the yellow pages. They all produce patterns from a simple motif – triangle. Using the same shape for each group means we can compare groups and appreciate the differences and similarities between them easily. In principle, the program required to produce patterns with a more complex shape will be identical – only PROCdrawmotifat will change (see table 1 for definitions of variables used). You can make up your own motifs and listings 18 and 19 demonstrate very well the use of more complex motifs.

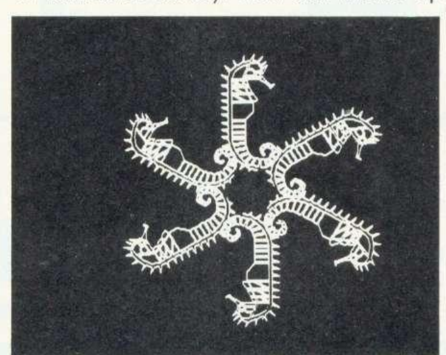


Figure 2. Star figure shows a symmetry when rotated about centre, but no mirror symmetry

When handling data there are three possible approaches when shapes or motifs are being drawn and redrawn. Originally the data for the shape will be held in a file which PROCdrawmotifat can simply read and re-read from. This is the simplest approach, but only suitable for use with discs. However, in the wallpaper group programs this technique is simulated using a single DATA statement. If the file is on cassette, it should be read once only and transferred into an array. This method also has the advantage that any transformations, such as reflection, need only be calculated once. The shape can be reflected and this version stored in the same array.

A third approach is to store the shape data in the program as a set of DATA statements that are created from a file automatically. Here you need a preprocessing program that converts the

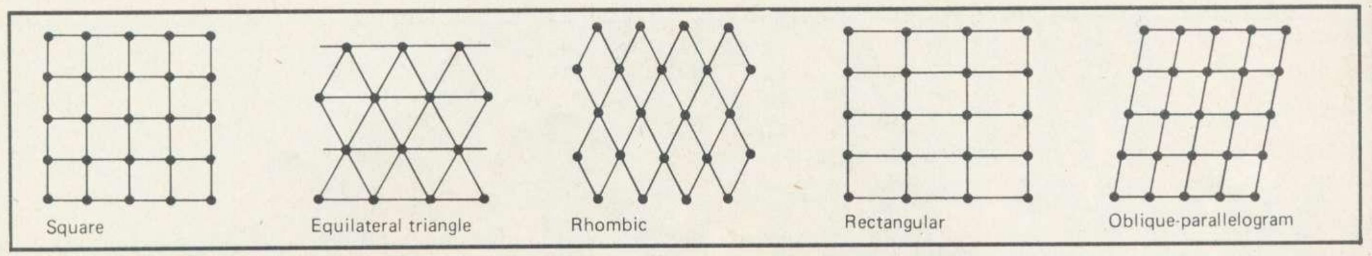


Figure 3. The five parallelogram nets. Shapes are placed on the point intersections to give symmetrical patterns

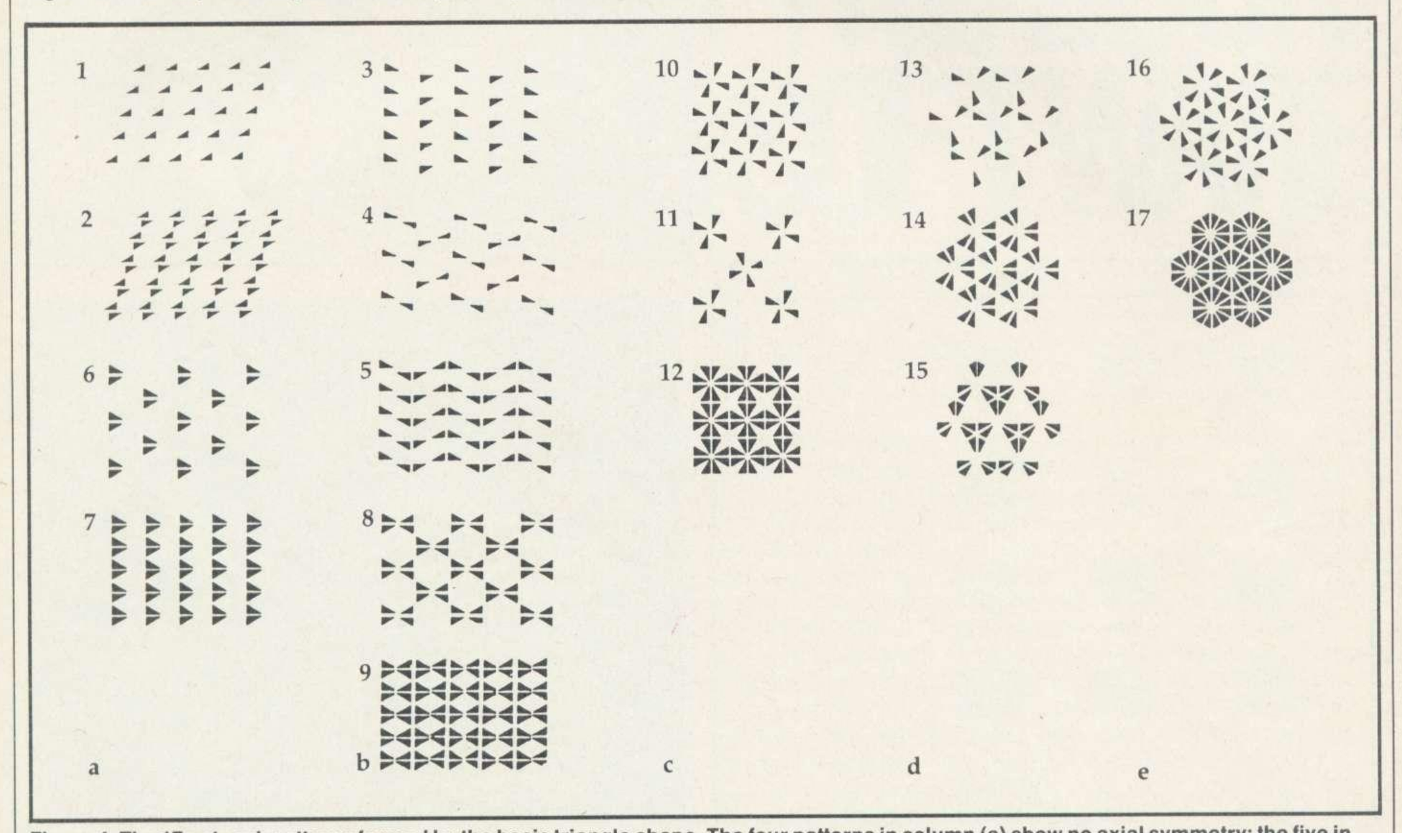


Figure 4. The 17 network patterns formed by the basic triangle shape. The four patterns in column (a) show no axial symmetry; the five in column (b) 180° symmetry; (c) 90°; (d) 120°; (e) 60° symmetry

file data into DATA statements for incorporation in a program. This can be done using *SPOOL and *EXEC.

Note that for more complex groups changes may have to be made in their position, otherwise they may overlap. To avoid this, groups should be placed further apart. The correct spacing for each grouping depends on the shape, the grouping used and aesthetic considerations. These adjustments are especially necessary with more complex motifs, such as the rhinoceros and daffodil motifs in listings 18 and 19.

Network patterns

When arranging motifs at equal intervals in a line, you obtain band or strip patterns, used extensively in fabric design and architecture. Now when placing motifs in two dimensions you use one of a number of translation 'nets' to control the shape translations. These are parallelogram nets, of which there are five (see figure 3) – square, rectangular, oblique, equilateral and rhombic. Each intersection in a net defines the co-ordinates of a point where the motif is to be placed. The symmetry class of a pattern is, in general, independent of the translation net. However, if the shape itself possesses axial symmetry, then using different translation nets may result in different symmetry classes.

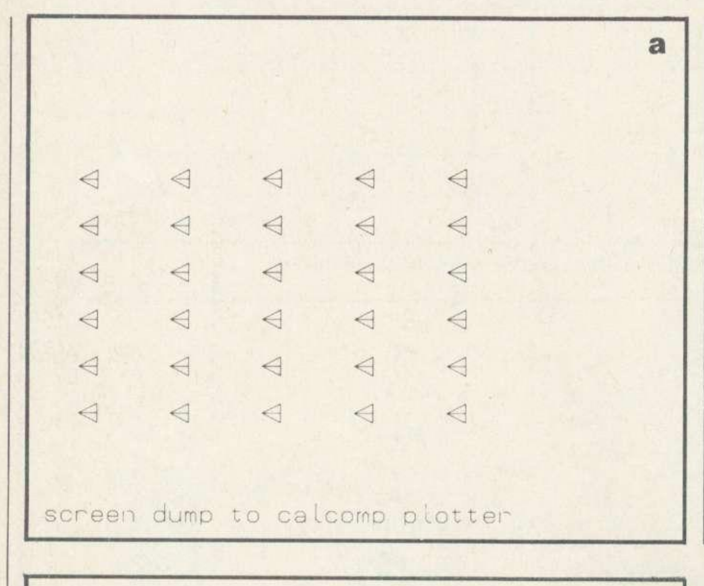
Another point to note here is that network symmetry is being used to place pre-drawn motifs. Using the network to divide up the plane into equal figures without gaps or overlaps is known as 'tessellating'. Mathematically both processes are the same but in computer terms they require completely different approaches. (Tesselations will be discussed next month.)

There are 17 possible symmetries of network patterns, and examples of all of these, using the asymmetrical triangle as a motif, are shown together in figure 4. This article only describes four of the network groups in detail.

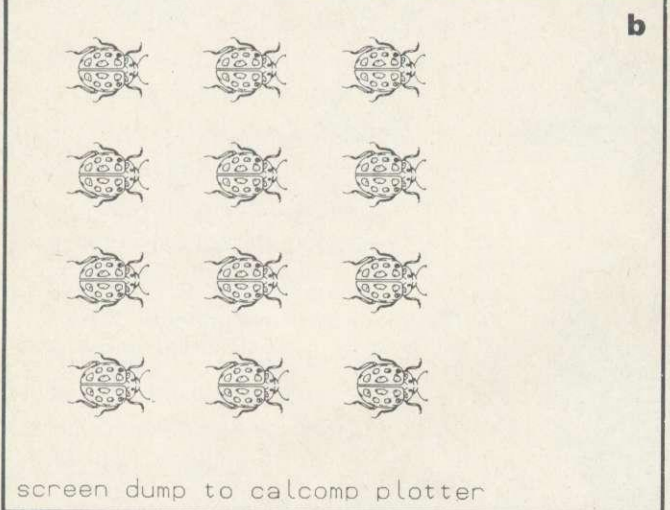
The easiest way to view the process is as follows. To generate each group or class select a particular translation net and place the motif or cluster of motifs at each point determined by the translation. The different groups are then categorised according to the symmetry exhibited by the motif cluster. The axial or cluster symmetry of the motif group then influences the overall symmetry of the network. Figure 4 will help you appreciate this point.

Network group 1

This is the simplest network group and is generated by placing a single motif at each of the specified points in a translation net (see example on page 72). Providing the single motif is asymmetric the resulting network possesses no symmetry at all. This means that if you consider the pattern printed on paper you cannot fold the pattern in any way that superimposes the part of the pattern on itself. Also there is no perpendicular axis about which the pattern can be rotated and come into coinci-







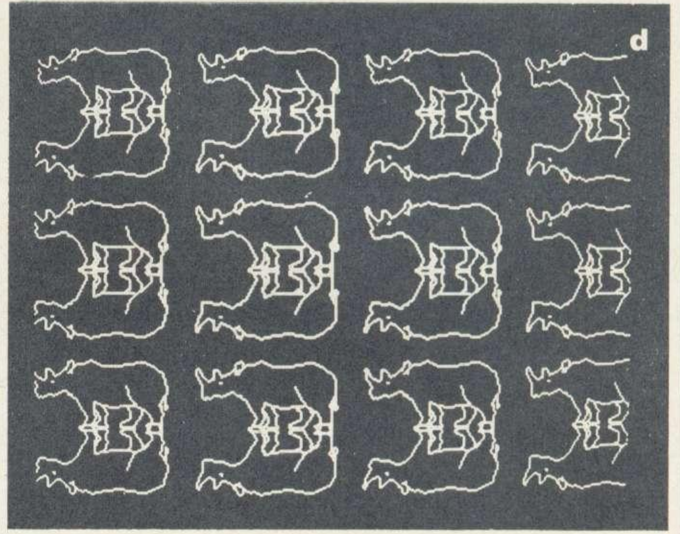


Figure 5. Four examples of network pattern 7. Pattern (a) is reproduced by listing 7. Half beetle replaces single triangle in (b). The Egyptians used this system to produce (c). The rhino picture is generated by listing 18, developed from listing 7

dence with itself after rotation (apart from 360 degrees).

The program for this network group works on the process of generating a band and repeating it. The program structure to generate a band is a FOR loop controlling a translation through the period 'a' for as many instances of the motif as are required. This is achieved by simply moving the origin through the period each time. Alternatively you can generate a column and repeat this.

To keep the programs reasonably short they are written using just one translation net. All 17 programs could be extended to use any allowable translation net. Allowable means that any net which preserves the symmetry group can be used. For example, all five nets can be used in group 1.

Network group 7

This group has lines of symmetry in one direction and no axial symmetry. It contains axes of glide reflections that coincide with the lines of symmetry, and is drawn by listing 7.

The example in figure 5c is Egyptian and belongs to network group 7 by virtue of the spirals – had these been concentric circles it would be an example of network group 9. A number of adjustments need to be made to listing 7 to generate listing 18, which uses the rhinoceros motif. The original data for this motif is specified on a 1000x1000 grid and so must be scaled down in PROCdrawmotif.

Network group 13

Network group 13 has 120 degree rotational symmetry points and does not contain any lines of symmetry. The motifs arranged in this network pattern impart a feeling of rotation. Listing 13 contains procedure calls that rotate the motif through angles of 120 degrees.

Figure 6c is Moorish and taken from the Alhambra Palace in Spain. Listing 19 uses a daffodil motif (again subject to scaling due to specification on a 1000x1000 grid) to demonstrate this network group.

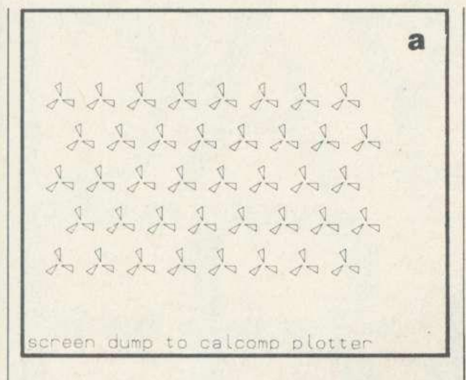
The origin of the motif is moved to the bottom of the daffodil stem so that on rotation three daffodil stems will meet in the centre of a cluster.

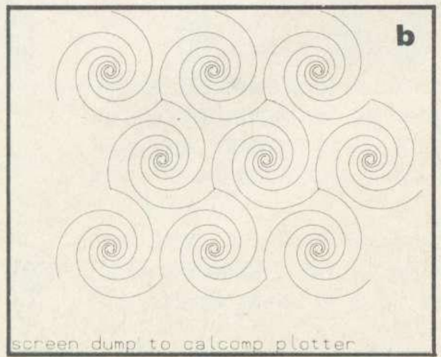
Network group 17

This possesses 60 degree rotational symmetry centres and lines of reflection. Examples are given by the colour pictures on page 73.

This article is the first in a series of four adapted by Stephen Maddock from *The Art of Microcomputer Graphics for the BBC Micro/Electron*. The book, by Jim McGregor and Alan Watt, is published by Addison-Wesley Publishers Ltd.

The listings for the 17 patterns and two demonstrations are on yellow pages 100 to 103





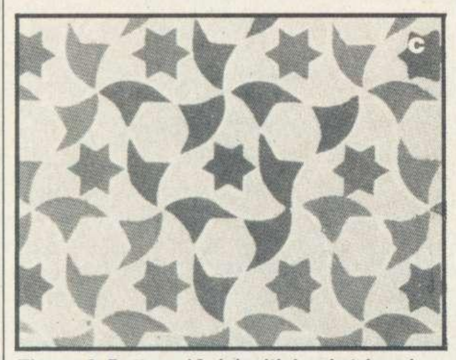


Figure 6. Pattern 13: (a) with basic triangles; (b) rotated spirals interlock; (c) Moorish use

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DAY OF THE FRACTAL

A fractal is a curve of infinite length and detail. Kim Aldis shows how to generate them on the micro

THE first time the subject of fractals was broached in the popular computer press, to my knowledge, was Susan Stepney's article in *Acorn User*, March 1984, on generating fractal curves by recursively inserting a shape inside itself. Prior to that, apart from obscure technical papers, the only source of good information had been a superbly illustrated book, *The Fractal Geometry of Nature*, by Benoit Mandlebrot – a remarkable man who is generally known and accepted as 'the father of fractals'. I spent a long time looking for that book, scouring most of London's book shops, receiving at best a blank look, at worst puzzled stares from assistants who probably thought they were dealing with a nutter. Eventually I tracked it down and it is still one of my most prized possessions.

There are many ways of generating fractal curves – Susan Stepney touched briefly on one, and I shall be looking in more detail at this method, showing two ways in which the range of curves may be increased. First, let's go over the principles involved.

The official definition of a fractal curve is: 'A set for which the Hausdorff Besicovitch dimension strictly exceeds the topological dimension.' I'll pretend the maths don't exist and look at it on a more understandable level.

Basically a fractal is a curve of infinite length with an infinite level of detail. No matter how closely you look at it, fresh detail is always revealed. This may sound a little puzzling at first, but the phenomenon occurs regularly in nature. Consider a coastline – a fine example of a fractal curve. Observation from a great height reveals coarse details, bays, larger islands, etc, but if you move in closer more detail then becomes apparent in the form of small inlets, even smaller streams and the like. Move in even closer, and rocks and stones are visible. No matter how close you go you always find there is more detail to be seen.

Figure 1. (a) define a shape by a series of co-ordinates (the generator), then scale and rotate it to fit between an initial pair of points (the initiator), (b) then repeat to fit between each successive pair of points from the last stage, and continue through (c) and (d)

Simulating this on a computer is not quite so frightening as it at first appears. One solution – the one we shall be looking at in detail – goes something like this. Define a shape by a series of co-ordinate points (the generator), scale and rotate it to fit between an initial pair of points (the initiator) and you get something like figure 1(a). The next step is to scale and rotate the generator points so they fit between each successive pair of points from the last stage, figure 1(b). Repeat as required for each new set of points created and the process continues as in figures 1(c) and (d). If this is done recursively, the process can be repeated to any level very elegantly using only a few lines of code.

This is the basic 'bottom level', but there are ways of making the curves more interesting. Consider what would happen if you stopped thinking of a generator as a continuous series of linked

points but looked at it as a series of lines, each defined by a start and end point. This opens up two new possibilities. First, lines can be disconnected, as in figure 2, allowing for the creation of 'islands' and 'lakes' within a curve – figure 2(a) shows the generator, and by BC, which causes the first insertion to be rotated effectively through 180 degrees.

This leads to a further refinement. So far we have seen two different ways of inserting a generator between two points on itself, one as normal and one creating it using the software listed with this article. If you need a clue the base is an equilateral triangle with the top third chopped off.

The software

Now for the highlight of the show – a

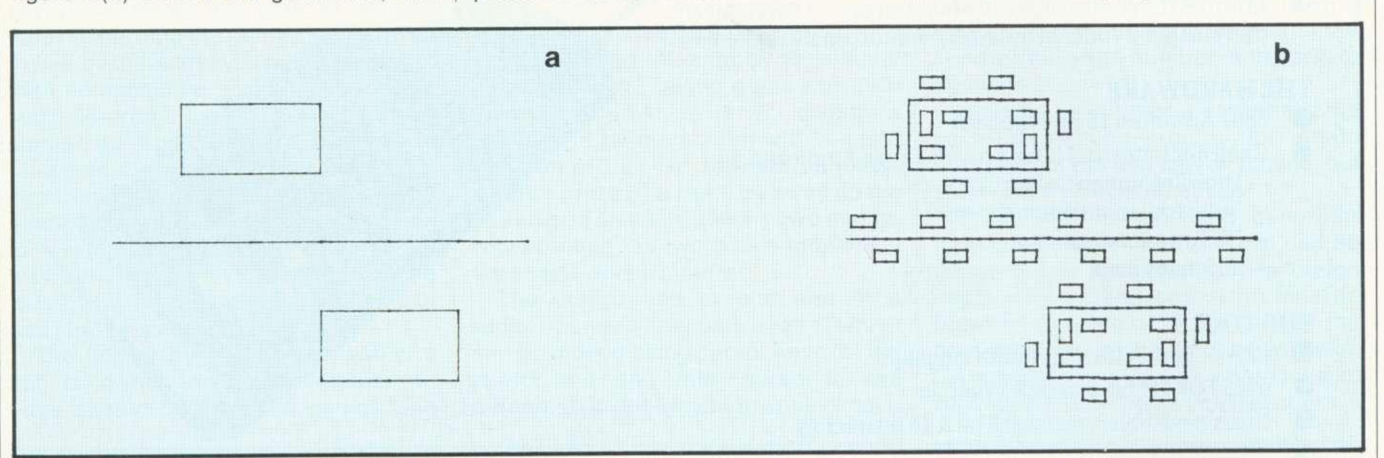


Figure 2. Lines can be disconnected to allow for the creation of 'islands' and 'lakes' within a curve. (a) shows the generator and (b) the first iteration

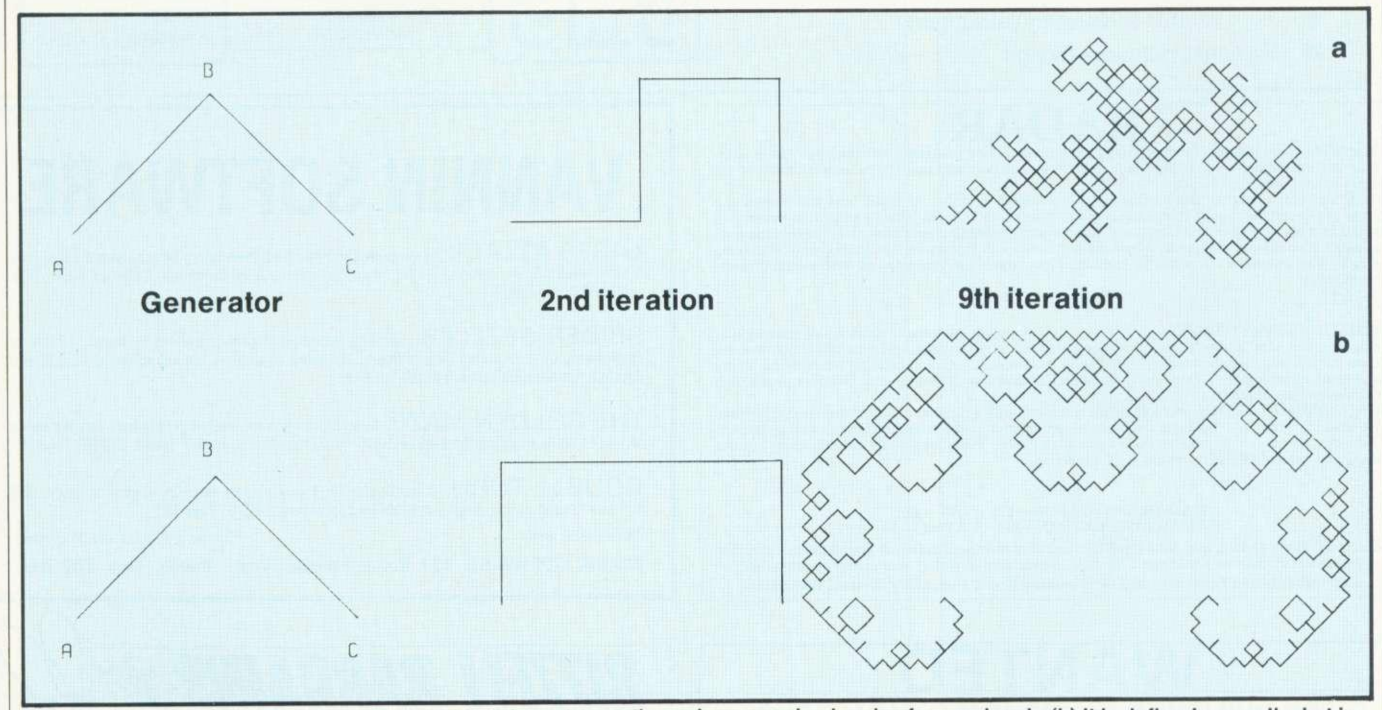


Figure 3. How the generators are defined affects the outcome through successive levels of recursion. In (b) it is defined normally, but in (a) it is rotated through 180 degrees.

figure 2(b) the first iteration. Secondly, and to some extent more importantly, you have a degree of control over how each section of the curve is split. In order to make this a little clearer look at figure 3. Both the generators in 3(a) and 3(b) look the same, but at the first level of recursion they are clearly different and at the ninth iteration there is no similarity at all. The difference between the two generators lies in the way they have been defined; 3(b) is defined normally with its two lines in the order AB, BC but 3(a) is in the order BA followed rotated through 180 degrees, but looking at figure 4 you'll see that there are four possibilities.

Achieving the remaining two is a simple matter of flipping the generator, before insertion – easily done by multiplying the y component of the generator by −1. The power of this is shown by Mandlebrot's Monkey Tree in figure 5, which uses combinations of reversed and mirrored lines so that when it splits down the curve avoids itself completely, creating an intricate and delicate pattern. You might like to try re-fully fledged, no holds barred fractal curve generator (listing 1 on the yellow pages) – through which you can create fractal curves visually or numerically, complete with all the features mentioned above, and then save them.

The program is hungry – not so much so that it causes problems with the tape filing system, but disc users will need to note the following:

- Set PAGE to &1300. This is as low as you can get since generators are saved and loaded as data files.

Continued on page 83 ▶

● Renumber the program with line increments of one as opposed to the usual 10.

First, a word about the coding. The real guts of the program are in PROCsplit, lines 830 to 980. This is the procedure that does all the hard work, the rest provides all the luxuries. All the data concerning the generator is stored in five parallel arrays (more for clarity than compactness) – two for X and Y start co-ordinates of each line, two similar for X and Y end co-ordinates. These co-ordinates are stored as real numbers which are a fraction of the distance between the points of insertion – for example a point lying exactly halfway between the two points would be (0.5,0) and the two points would be (0,0) and (1,0) respectively.

The fifth array is mirr% in which a flag is stored indicating whether an edge should be mirrored or not. The concerned with loading and saving generators and initiators, and are fairly straightforward. All generators are saved as data files with a G. extension, similarly initiators are saved with an I. extension, so the wrong data can't get into the wrong storage area.

Designing shapes

The designing of shapes is slightly more complex. Taking generator definition first, pressing f5 will display a dotted grid on the screen with a flashing cursor to the left and another smaller grid to the right. Halfway up the dotted grid on each side are two marks, representing the two points into which the shape will be inserted.

The cursor lies at one end of a rubber-banded line, both ends of which can be moved using cursor keys for the cursor end, and Shift+cursor for the other end. In this way both ends of each resident functions; SQR, SIN, etc. You can return to normal data entry in the event of a mistake by pressing f8 again. In this instance the data just entered will be ignored.

The mirroring facility described above can be toggled on and off for any given edge with f9. When this is on a small 'm' will be displayed next to the appropriate edge number in the grid to the right.

Defining an initiator is essentially the same as defining a generator. Again both ends of the line can be moved, but mirroring will have no effect.

Once both initiator and generator have been designed the curve can be generated by pressing f6. A recursion depth will be asked for and this must lie between one and nine. Remember the deeper this goes, the longer it will take. On a complex curve with a high level of recursion this could be several hours.

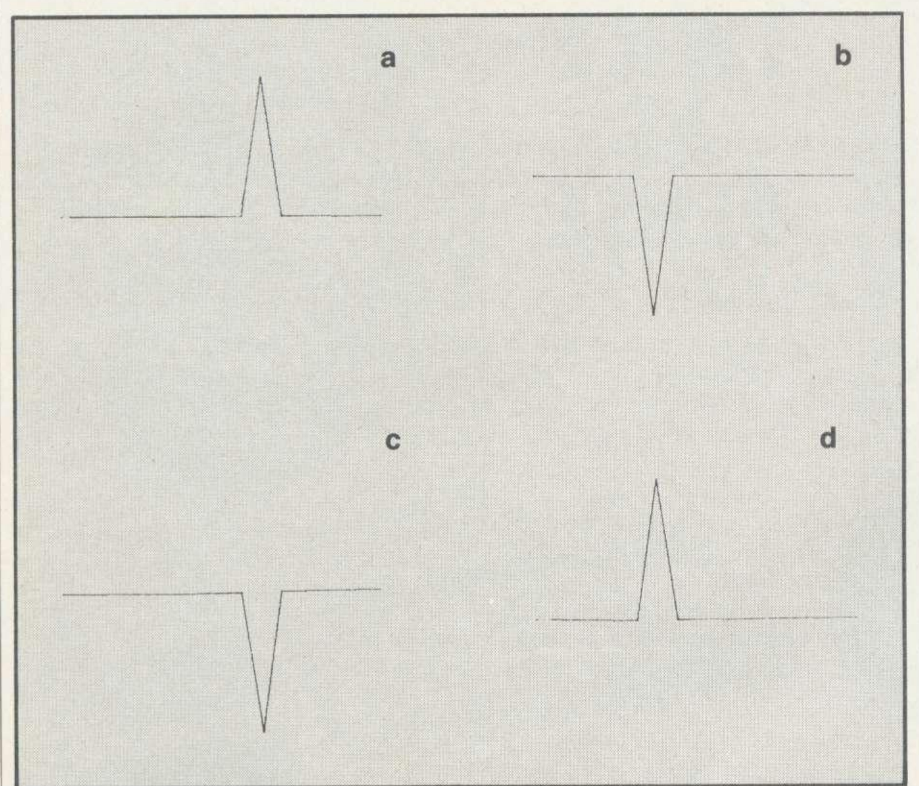


Figure 4. The four ways of inserting a generator between the points on itself. (a) normal insertion, (b) 180 degrees, (c) mirroring and (d) 180 degree rotation plus mirroring

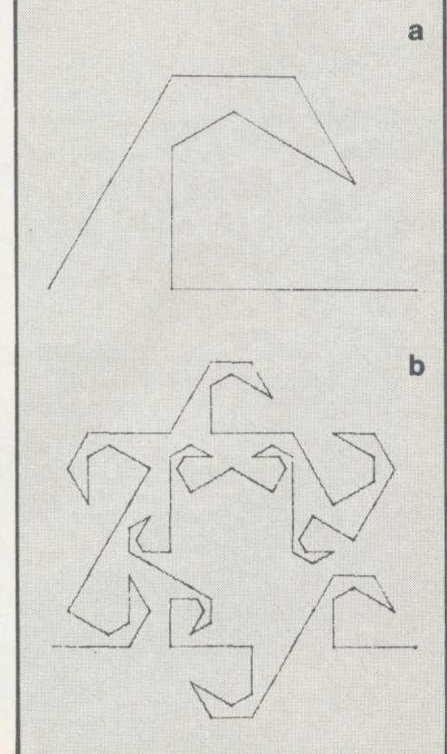


Figure 5. Mandlebrot's monkey tree, (a) generator, and (b) first iteration

procedure contains a loop, lines 870 to 960, which for each edge either draws part of the curve or recalls itself, depending on how deep the level of recursion is. Rotation and scaling are by a simplified matrix multiplication and if the current edge is to be mirrored then its Y component is multiplied by −1.

When the program is run a menu is displayed, listing the available options and how to get at them. You can return to this at any point via the Escape key without losing data.

The first four options (f0 to f3) are generator edge are defined as described previously.

The line is fixed in place with the Return key and the user is automatically taken into the next edge. When the shape is complete the routine is exited using the Delete key.

Co-ordinates can also be entered numerically, for greater accuracy, by pressing f8. This will then expect four entries; start X/Y co-ordinates and end X/Y co-ordinates with a carriage return after each. The routine uses the EVAL function so you can use any of the Basic

Two final points: any operating system commands can be accessed using '*' in the normal way and there is a user routine – PROCuser – at the end of the listing for the benefit of anyone wishing to install printer dumps. Again, memory is a little short so go steady, but above all, have fun.

The listing for Kim Aldis' fractal curve generator is on yellow pages 104-106.

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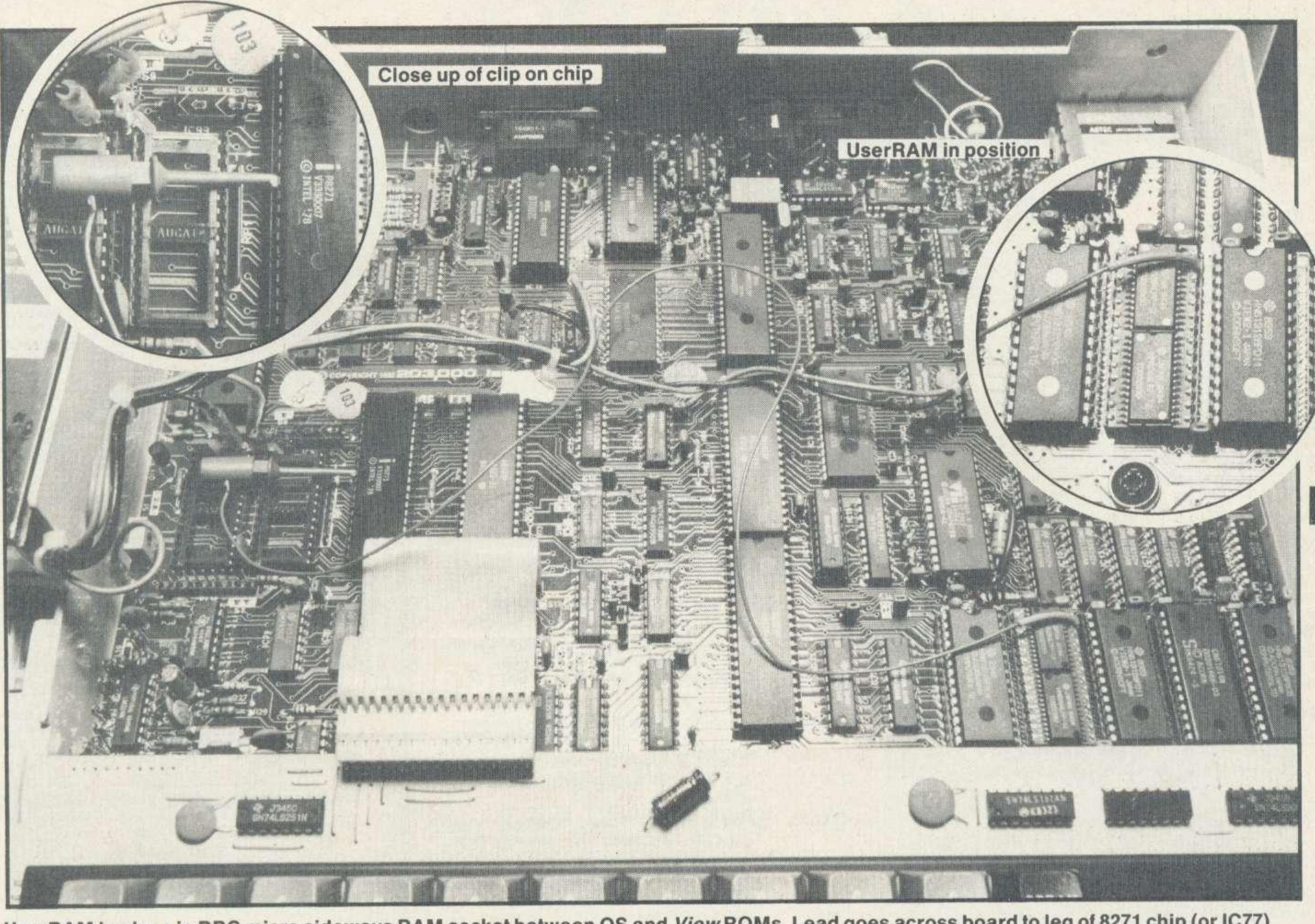
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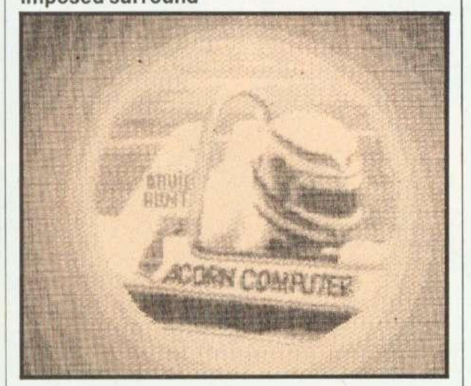
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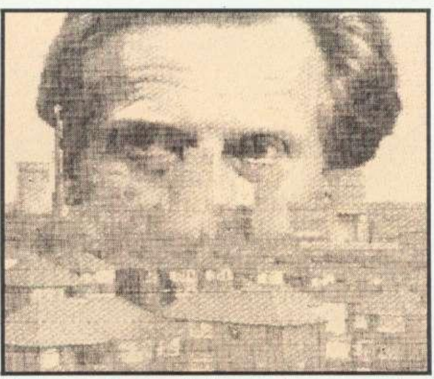
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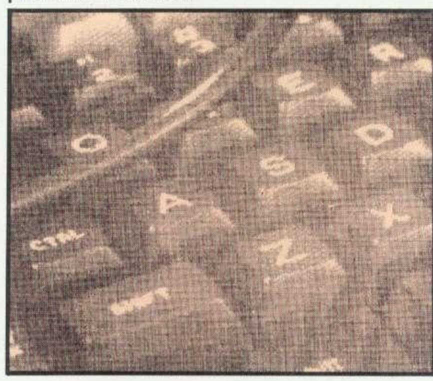
Be imaginative and think up an original use for a digitiser





Video digitiser art in action: Mr Spock from *Star Trek the Movie* (above); and Acorn-sponsored driver David Hunt with superimposed surround





'Tarzan in the jungle' (above), composed of two superimposed images and 'cleaned up' with a lightpen; and the keyboard, posed for a camera

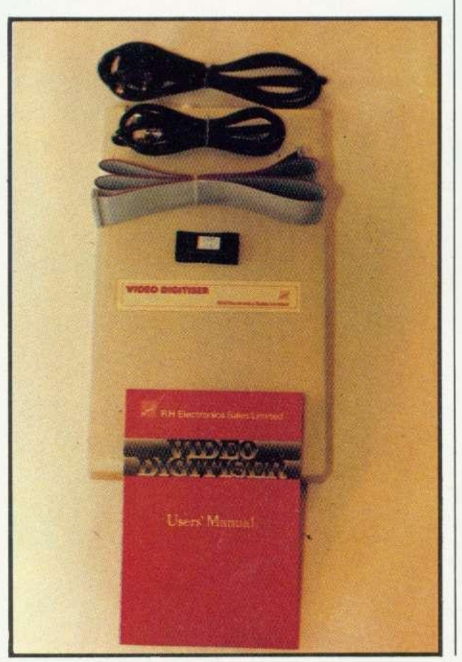
A VIDEO Digitiser and Lightpen from RH Electronics is the big prize in this month's competition – with RH Lightpens and software (each worth £50) awaiting the two lucky runners-up.

The Digitiser will take a still frame from a video cassette recorder or camera (via a composite video interface) and display it on a TV or monitor in a BBC micro graphics mode.

The picture can then be saved on tape or disc, printed out, or even edited with a lightpen (as seen on the Thames TV programme *Database* in July).

The Digitiser – worth £199 – comes in a case similar to Acorn's own second processors' complete with ROM software, manual, and leads to the BBC micro (it connects to the 1MHz bus) and VCR.

Entering the competition is simplicity itself. All you have to do is think up a novel, practical use for the Digitiser



and describe it to us in no more than 50 words.

The idea could be for schools, hospitals, business or in the home – let your imagination run riot, and see what you can come up with.

Entries will be judged by Sandy Dow, managing director of RH Electronics and Tony Quinn, editor of *Acorn User*.

Any competition winner who already has an RH Digitiser or Lightpen will be given a full refund.

How to enter

Write out or print your idea for a practical use for the digitiser in less than 50 words, attach it to the form below and send them to: October Competition, Acorn User, 68 Long Acre, London WC2E 9JH.

The closing date for receipt of entries is October 31.

June winners

JUNE'S competition produced an enormous response – just under 4000 entries, about 75 per cent correct. The solution was 13,573, obtained from 765, 970, 945, 992, 749, 841, 758, 888, 941, 756, 992, 466, 879, 999, 975, 657.

The first correct entry out of the bag and winner of a BBC micro, monitor disc drive and printer was Paul Taylor of London.

Fill in this form, and attach it to your entry describing in less than 50 words a practical, novel use for the RH Electronics Video Digitiser, and send it to October Competition, Acorn User, 68 Long Acre, London WC2E 9JH. Closing date is October 31.

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1. July/August 1982 The first issue. Articles on drawing techniques. The BBC Computer Programme. Machine code graphics. Questions & answers. Hints and Tips. Sound. Interfacing scientific instruments. Dumb Terminals for 0.1 machines. Disc drives. Econet in schools.

2. September Ceefax telesoftware. Beeb in business. Mailing list. Simple files. 30-Hour Basic course. Art on a micro. Music. BBC micro as a keyboard. Extra Atom commands. BBC Basic board. ULA design. Teletext graphics. Machine code graphics. Analogue input. Schools training. 0.1 cassette bug patch.

3. October Electron details. BBC TV series – confessions. Two Epson graphics dumps. Seikosha GP100 dump. Worldwide networking for BBC micro. Garbage handling. Voice ROMs. Sound pitch envelope. Moving graphics. ZX printer for Atom. RGB colour separations for Atom. Biofeedback. Book reviews.

4. November Teletext. Second BBC TV series. Machine code series 1. Programming forum. *Trek III*. Speeding up graphics. Bomber game listing. 7-tone Epson graphics dump. Atom graphics manipulation. Dumb terminal for 0.1 machine. Firework graphics. Editing tips.

5. December BBC TV in schools. Machine code 2 – registers. Programming forum. Program generators. Carols. Hints & Tips. Logo and Turtle graphics in schools. Introduction to procedures. Software review. Atom word processing. Toolbox review. 16-colour graphics on model A. Sorting. Sound envelope design.

6. January 1983 MEP school launch. *FX commands for sound. Second BBC TV series. Machine code 3 – two pass assembly. Disc drives for the Beeb. Programming forum. Program protection. Micros in schools – new series. Commodore Pet printer used with Beeb. BBC programs written on an Atom. Extra Atom memory.

7. February 1 MHz bus examined (4). 3D Atom graphics (3). Atom BBC Board reviewed (3). Machine code 4 – memory (5). BBC Computer Literacy update (1). Atom error handling (2). Micros in schools 2 – getting organised (6). Hints and Tips (4). Beeb Forum (3). Reviews of *Wordwise* (2) and the Amber printer (1).



8. March Chess on the BBC micro (3). Sound on the Beeb (4). Printers for beginners (4). Atom analogue converter (2). Schools 3 – micros and maths (6). Machine code 5 – indirect addressing (3). DIY lightpen (5). MEP's *Microprimer* review (2). Atom Ross toolkit review (1). Beeb Forum (2). Assembly language and Pascal book reviews (2).

9. April *Hexangle* game listing (4). Bach on the Beeb (4). Hints & Tips on disc drives (4). Machine code 6 – the CALL statement (4). Interfacing the 1 MHz bus (3). Schools 4 – young children and micros (6). Graphics listings (2). Printers for beginners 2 (4). Reviews of BCPL, educational software and Atom software (3).

10. May Review of Basic II(1). Graphics listings(1). New *FX calls in OS1.2(1). Colour mixing on the Beeb(4). Jazz, blues and folk on the BBC(6). Schools 5 – language development(6). DIY Beeb interface box(4). Atom sound board(5). A to Z of printing: how to get going(4). Hints and Tips: PROCs, discs and FNs(5). Printer, software and book reviews.

11. June Techniques series – sorting(2). Hints and Tips: 50p network(5). Drawing techniques and CAD(5). Machine code: interrupts(6). Schools 6 – information technology. Atom Forum. Beeb Forum. Printers – write your own graphics dumps(4). Comparative review of *View* and *Wordwise*(3). Three graphics packages reviewed(3). Test of *Acorn User*'s interface box(4).



12. July Techniques – hash tables(2). Hints and Tips: logic made easy(5). Recursion and graphics(6). Handling strings(3). Two ideas for passing variables(2). Beeb aids the blind(2). DIY second keyboard(5). Beeb Forum. Sounds on the Atom(2). Hardware, firmware, software and book reviews. Atom Forum.

13. August Printer graphics and dumps(2). Techniques – Tree structures and sorting(2). All the fun of the fair(7). 40/80 disc copier(2). Colour painting(5). Basic II: random access files(2). Screen dumps for Olivetti, Centronics and Seikosha(5). Atom strings(3). Reviews of Tandy CGP115 printer, five educational packs, A to D converter.

14. September Techniques – ink-blots and mazes. Painting by lightpen. DFS space explored. Beeb Forum. *Mega Monsters* game listing. Machine code



graphics dumps. Atom Forum. Atom cassette recorder check. Reviews of Atom RAM boards, Cumana disc manual, *Logo* for schools, Hobbit floppy tape and books.

15. October Women and computing. Techniques – random numbers. Review of Computer Concepts' *Beebcalc*. Fractal graphics. 57 files on 40 & 80 track discs. *Vampire* game listing. Beeb Forum. Assembly code controls tab key. Osfile merging. Atom future. Atom verify routine. Reviews of *Vu-Type*, Procyon Atom book, Epson FX80, Teletext adapter, disc drive, software.

16. November Techniques – impossible problems. Contour graphics. Connecting two Beebs together. XREF: sorts & lists variable, function and procedure names. Assembler utilities in Basic II. OS, VDU, *FX, OSBYTE calls – **pull-out poster**. Disc overlays. Adding extra Atom commands. Reviews of 7 educational packs, Atom ROM, books, games.

17. December Random graphics. Animated graphics in colour. Techniques – graphs. Hints & Tips. Universal printer dump. 6522 connected to the Electron. Saving machine code. Beeb Forum. Graphics **pull-out poster**. **Index:** July 82–July 83. Forum Extra: EQUS. BBC helps the disabled. Schools – data processing. Transferring data between Beebs, Atoms . . . or Pets. Atom block demolition utility. Atom disassembler program. Reviews of software, books, educational programs from Chalksoft.

18. January 1984: Games special issue Techniques – graphs part 2. Stacks and queues, Basic and languages. Hints & Tips. Voice chip revealed. How to write games. Electron interfacing. Beeb Forum. Life graphics routines. *Defencecom* game listing. *The Train Game* listing. Machine code graphics. Where to put machine code. Schools – handling data. Juki daisywheel printer examined. Atom Forum and adventure. Reviews of utilities, software, *Beeline* wordprocessor, educational packages, two chess programs.

19. February: Adventures special issue Techniques – efficient sorts(3). PROC for a numeric keypad on the Beeb keyboard(1). 12 graphics listings(1). Random access filing on disc(5). Locking files(2). MCP40 printer/plotter looked at(5). Hints & Tips(3). Beeb Forum(2). Make discs readable on 40 and 80 track drives(4). Screen memory organisation(3). Hints on adventure design(3). Adventure action(4). Adventure ideas in computer language(2). Text compression(2). Word-crunching(4). VIA chip on Electron to drive a parallel printer(3). Atom Forum(2). Schools – simulation packages(4). Reviews: *Disc Doctor*, Leasalink's DFS upgrade, Hitachi's microdrive system, Solidisk's sideway RAM board, software.



20. March Utility: timing routine. Fractals. Teletext and mode 7 dump. ROMs reviewed. Hints & Tips. Beeb Forum. Add sounds to your games. Learn Lisp 1. Cube graphics. Printer driver for View. Basic II from Basic I. Beeb's ADC chip. Atom Forum. Listing formatter for the Atom. Atom 'bytes free' routine. Schools – test of *Factfile*. Keyboard skills. Amcom DFS v Acorn DFS. Reviews: *Beebpen* wordprocessor, Atom expansion system, software, books.

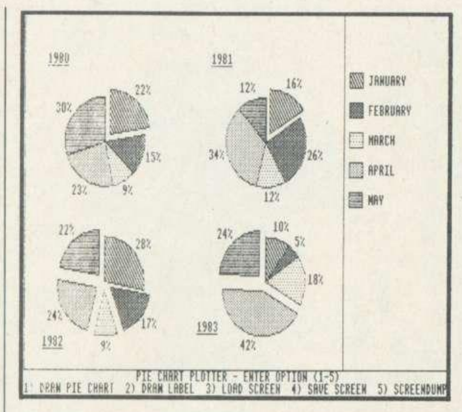
21. April Beeb graphics on TV(3). 6845 chip explored(3). Advanced filing systems(1). Lisp 2(4). Hints & Tips(3). Beeb Forum(4). Choose disc tracks to copy(4). Function key editing(4). Teletext dumps(3). CES scrutinised(3). Passing variables(2). Computer Concepts' graphics ROM(4). Schools – simulations(4). Calculating Easter dates(3). Better programming(3). Atom Forum(2). Atom ROM routines(5). Converting BBC to Atom Basic(2). Three printers compared(2). Reviews: software, Aries B20 RAM board, *Toolkit*, Monitors.

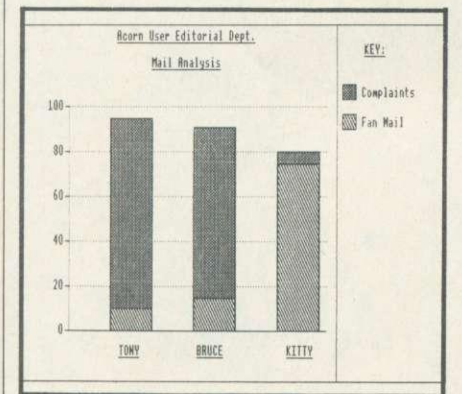
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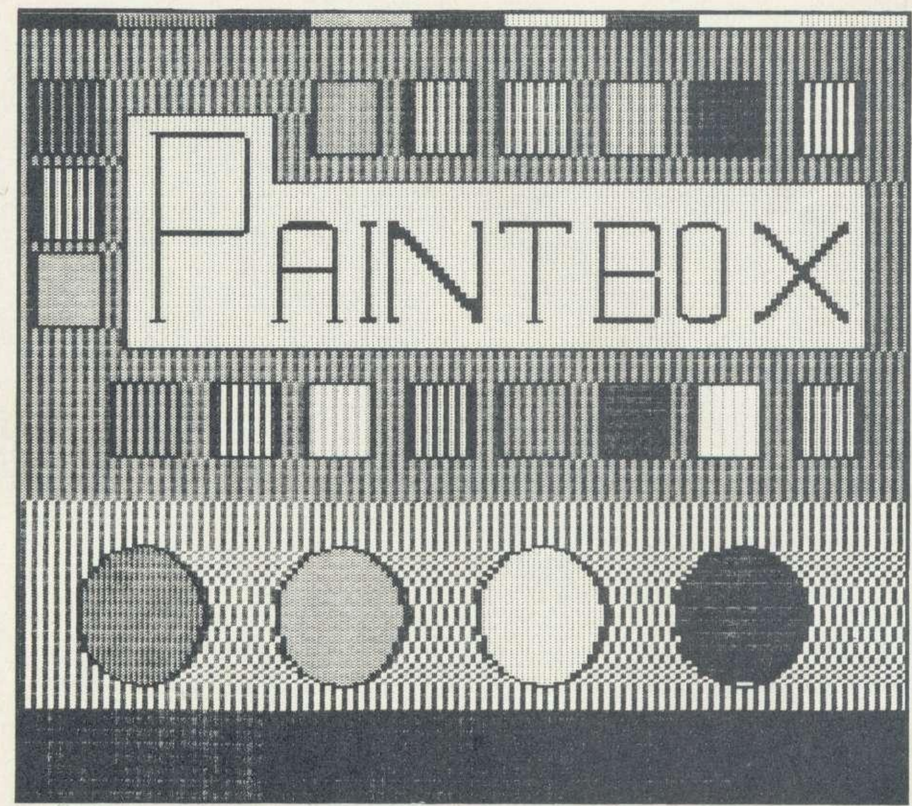
Eleven issues are not available – July 1982; February, March, April, May, June, July and August 1983; February, April and June 1984. Photocopies of articles are available at 18p a page (minimum charge 50p, inclusive of postage). Orders should be addressed to AU Photocopies, Redwood Publishing, 68 Long Acre, London WC2E 9JH. Figure in brackets indicates the number of pages in each article.

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Above: Paintbox palette; top left: pie chart from Dotfill; bottom left: Peter Sandford's bar charts; below left: Sprite designer

GO FOR OUR GRAPHICS CASSETTE

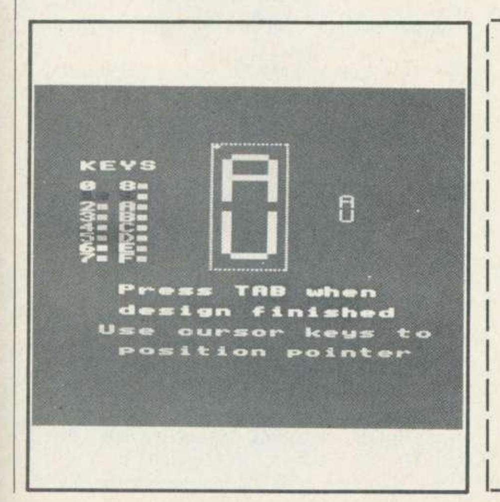
FOUR of the most popular and useful graphics programs that we've presented in *Acorn User* – Rob Fenton's *Paintbox*, Peter Sandford's *Colfill* and *Dotfill* and Harry Sinclair's Sprite designer – are now available on one cassette at a special introductory price for this month only of £3.75.

Paintbox, from the February 1985 issue, offers you a wide palette of facilities – airbrushing, drawing circles and squares, colour filling, colour mixing and textured effects – and it's fast!

Peter Sandford's *Dotfill* and *Colfill* (January and February 1985) allow you to produce bar charts, pie charts, maps, etc, with up to 28 coloured fill patterns and 24 tone patterns, and to mix foreground and background colours. The routines are easily incorporated into your own programs.

The final suite of programs is Harry Sinclair's Sprite designer from the September, October and November 1984 issues of *Acorn User*. It lets you design full-colour cartoon figures quickly, then edit, clone or mirror them and move them around the screen – an indispensible aid to all aspiring games authors.

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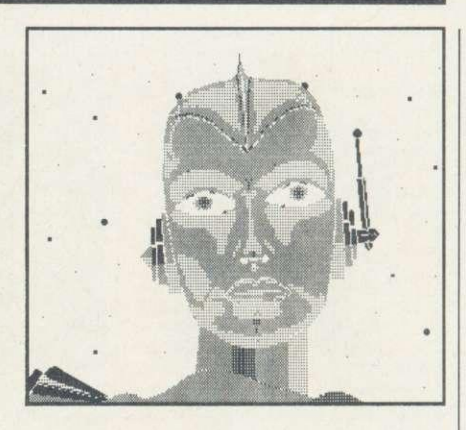
Address..

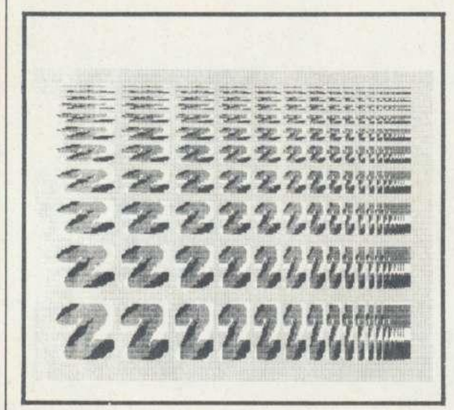
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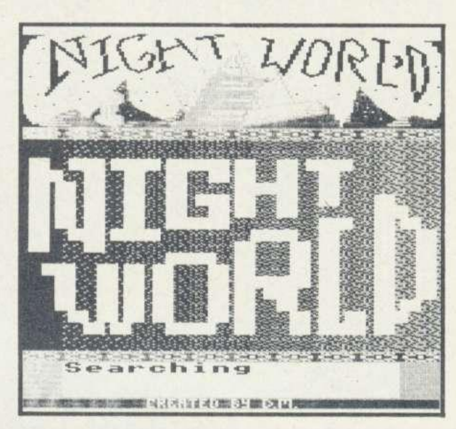
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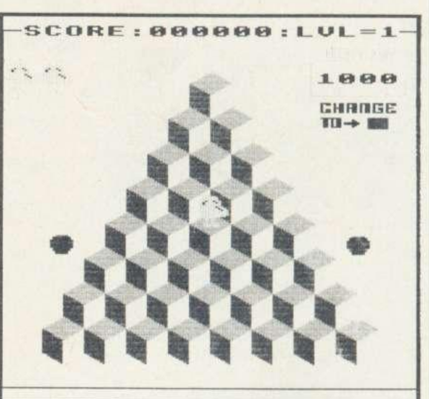












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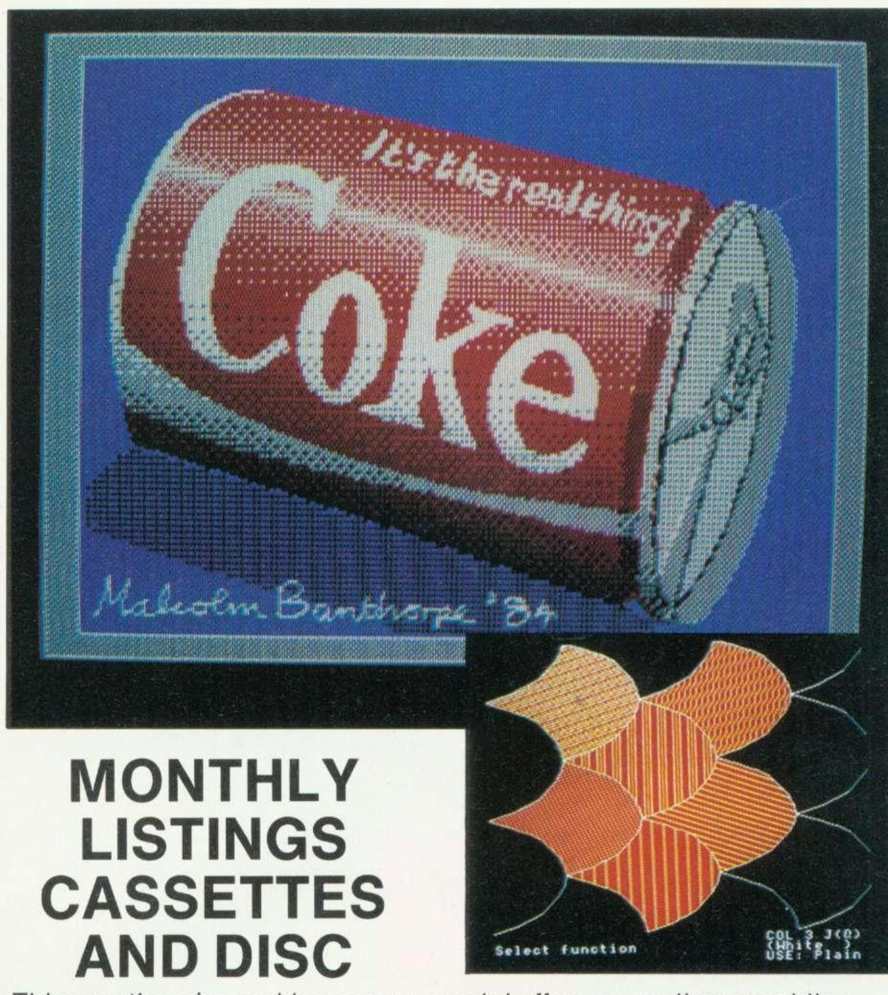
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***JDUMP**	colour dump for the JX80 printer
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***RTT**	restores a teletext screen after *TRANSTT
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***RESET**	turns off the effect of *SET
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***SHIFT**	shifts an area of memory
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***IBM**	selects an IBM style printer
***EPSON**	cancels *CP80 or *IBM and selects Epson-style printer





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This month we're making a very special offer – as well as providing all the major programs in this issue on the monthly listings cassette, they'll also be available – for the October issue only – on disc at £5.75. The disc version will also feature graphics screens from this issue – including those pictured above – in all 150k of information compacted on a 100k disc.

Of course all the cassettes of listings from back issues are still available at £3.75, so if typing's not your strong point, fill in the form below and send it with your remittance to Acorn User Products, PHS Mailing Ltd, PO Box 14, Horley, Surrey RH6 8DW.

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INDEX

PROGRAM		Page	BBC B	BBC B+	6502SP*a*	Electron	Monthly cassette
Paint:	Listing 1	97	●	●	●	●	●
	Listing 2	97	●	●	●	●	●
	Listing 3	99	●	●	●	●	●
	Listing 4	99	●	●	●	●	●
Network Patterns:	Listings 1-19	100-104	●	●	●	●	●
Fractal Generator:	Listing 1	104-106	●	●	●	●	●
Easyplot:	Listing 1	107	●	●	●	●	●
	Listing 2		●	●	●	●	●
JX80 Printer Dumps:	Listing 1	109	●	●	●	● *b*	●
	Listing 2		●	●	●	● *b*	●
	Listing 3		●	●	●	● *b*	●
	Listing 4						●
	Listing 5						●

a Set PAGE to &1900 before running the programs *b* Plus 1 required

Entering listings

Where possible, programs are listed with line numbers in increments of 10. With these listings, simply type AUTO <RETURN> before you begin. This will give automatic line numbering. Don't type a space after the line number. To list your program so it appears identical to the printed version in the magazine, type: LISTO 1 <RETURN> WIDTH 40 <RETURN> LIST <RETURN>

With screen modes 1,4,6 or 7, WIDTH 40 is not needed. Note that occasionally, for clarity, programs are listed with a text width different to our standard of 40 characters.

Most typing mistakes in Basic will cause error messages when the program is run. Finding errors in assembly language listings is often harder, so we provide checksums where we can. These are small routines which report any mistakes in assembled machine-code. In the August issue of *Acorn User* we published a program for calculating checksums for Basic programs. See page 109 for details of our monthly Basic checksum sheets.

Listing 1. Header program for *Freehand* – see page 100 if you have cassette

```
   10 REM Paint
   20 REM by Chris Steele
   30 REM for BBC B/B+ and Electron
   40 REM (c) Acorn User October 1985
   50 :
   60 MODE 1
   70 :
   80 VDU 5
   90 VDU 24,0;100;1279;1023;
  100 VDU 28,0,31,28,29
  110 :
  120 *FX 225,200
  130 *FX 226,210
  140 *FX 227,220
  150 *FX 190,8
  160 *FX 16,2
  170 *FX 11,0
  180 :
  190 PROCcolours
  200 PROCcharacters
  210 F%=&9C0:$F%="           "
  220 K%=1:L%=0:E%=3:J%=1
  230 X%=400:Y%=400
  240 A%=3:B%=0
  250 W%=100:H%=100
  260 R%=50:S%=150
  270 :
  280 PAGE=&1300
  290 CHAIN"P2"
  300 :
  310 END
  320 :
  330 DEF PROCcharacters
  340 VDU 23,224,0,8,8,8,119,8,8,8
  350 VDU 23,225,24,24,24,231,231,24,24,
24
  360 VDU 23,226,60,102,195,129,129,195,
102,60
  370 VDU 23,227,195,129,0,0,0,0,129,195
  380 :
  390 VDU 23,228,0,0,7,4,4,7,0,0
  400 VDU 23,229,0,15,24,16,16,24,15,0
  410 VDU 23,230,31,48,96,64,64,96,48,31
  420 VDU 23,231,192,128,128,0,0,128,128
,192
  430 :
  440 VDU 23,232,0,0,224,32,32,224,0,0
  450 VDU 23,233,0,240,24,8,8,24,240,0
  460 VDU 23,234,248,12,6,2,2,6,12,248
  470 VDU 23,235,3,1,1,0,0,1,1,3
  480 :
  490 VDU 23,236,0,0,0,0,8,0,0,0
  500 VDU 23,237,0,0,0,24,24,0,0,0
  510 VDU 23,238,0,24,60,126,126,60,24,0
  520 VDU 23,239,60,126,255,255,255,255,
126,60
  530 :
  540 VDU 23,240,0,0,0,3,3,0,0,0
  550 VDU 23,241,0,0,7,15,15,7,0,0
  560 VDU 23,242,0,15,31,63,63,31,15,0
```

Continued ▶

◀ *Continued*

```
  570 VDU 23,243,63,127,127,255,255,127,
127,63
  580 :
  590 VDU 23,244,0,0,0,192,192,0,0,0
  600 VDU 23,245,0,0,224,240,240,224,0,0
  610 VDU 23,246,0,240,248,252,252,248,2
40,0
  620 VDU 23,247,252,254,254,255,255,254
,254,252
  630 :
  640 ENDPROC
  650 :
  660 DEF PROCcolours
  670 D%=&900
  680 $D%="Plain":$(D%+6)="Or    "
  690 $(D%+&C)="And   ":$(D%+&13)="Ex-Or"
  700 FOR I%=D%+&20 TO D%+&B8 STEP &8
  710 READ $I%
  720 NEXT I%
  730 ENDPROC
  740 :
  750 DATA "Black  ","Red    "
  760 DATA "Yellow ","White  "
  770 DATA Black,Red,Green,Yellow
  780 DATA Blue,Magenta,Cyan,White
  790 DATA Blk/Wht,Red/Cyn,Grn/Mag
  800 DATA Yel/Blu,Blu/Yel,Mag/Grn
  810 DATA Cyn/Red,Wht/Blk
```

Listing 2. Chris Steele's main *Freehand* program

```
   10 REM P2 - main program
   20 REM by Chris Steele
   30 REM for BBC B/B+ and Electron
   40 REM (c) Acorn User October 1985
   50 :
   60 LOMEM=TOP+&700
   70 T%=TOP
   80 ON ERROR GOTO 850
   90 PROCstatus
  100 :
  110 PROCupdatek
  120 PROCselect
  130 CLEAR
  140 LOMEM=T%+&700
  150 GOTO 110
  160 END
  170 :
  180 DEF PROCselect
  190 IF K%>209 THEN PROCovmenu:ENDPROC
  200 ON K%-199 GOSUB 300,310,320,330,35
0,390,440,490,750,800
  210 ENDPROC
  220 :
  230 DEF PROCupdatek
  240 IF K%>199 AND K%<230 THEN ENDPROC
```

Continued ▶

◄ Freehand listing 2 continued

```
  250 PROCprt("Select function")
  260 REPEAT:K%=GET
  270 UNTIL K%>199 AND K%<230
  280 ENDPROC
  290 :
  300 A%=0:PROCstatus:K%=0:RETURN
  310 A%=1:PROCstatus:K%=0:RETURN
  320 A%=2:PROCstatus:K%=0:RETURN
  330 A%=3:PROCstatus:K%=0:RETURN
  340 :
  350 B%=(B%+1)MOD4
  360 PROCstatus:K%=0
  370 RETURN
  380 :
  390 E%=(E%+1)MOD4
  400 PROCprt("Brush "+STR$(E%))
  410 PROCbrushes(224+E%,32,236+E%,32)
  420 RETURN
  430 :
  440 E%=4+(E%+1)MOD4
  450 PROCprt("Broad Brush "+STR$(E%-4))
  460 PROCbrushes(224+E%,228+E%,236+E%,2
40+E%)
  470 RETURN
  480 :
  490 PROCprt("Rubber banding")
  500 REPEAT
  510 PROCcursor(224,32)
  520 K%=INKEY(1)
  530 UNTIL hit% OR K%>199
  540 IF K%>199 THEN RETURN
  550 REPEAT
  560 PROCband(X%+16,Y%-16)
  570 UNTIL K%>199
  580 RETURN
  590 :
  600 DEF PROCband(px%,py%)
  610 GCOL 3,A%
  620 PROCletgo
  630 REPEAT
  640 PROCcursor(224,32)
  650 x%=X%+16:y%=Y%-16
  660 MOVE px%,py%:DRAW x%,y%
  670 K%=INKEY(1)
  680 *FX 19
  690 MOVE px%,py%:DRAW x%,y%
  700 UNTIL hit% OR K%>199
  710 IF hit% GCOL B%,A%:MOVEpx%,py%:DRA
W x%,y%
  720 px%=x%:py%=y%
  730 ENDPROC
  740 :
  750 J%=(J%+1)MOD3
  760 PROCstatus
  770 K%=0
  780 RETURN
  790 :
  800 IF FNget("Clear screen to "+$(D%+&
20+A%*&8)+" (Y/N) ?")="Y" THEN GCOL B%,A
%+128:CLG
  810 K%=0:RETURN
  820 :
  830 REM Error handler
  840 :
  850 ON ERROR OFF
  860 VDU 4,12
  870 REPORT
  880 PRINT" at line ";ERL
  890 PRINT"PRESS ANY KEY TO CONTINUE";
  900 VDU 3
  910 CLOSE#0
  920 *FX 15,0
  930 K%=GET
  940 RUN
  950 :
  960 DEF PROCletgo
  970 TIME=0
  980 REPEAT
  990 PROCcoords
 1000 IF TIME>300 THEN PROCprt("Release
```

Continued ►

◄ Continued

```
'hit%' button")
 1010 UNTIL NOT hit%
 1020 *FX 15,0
 1030 ENDPROC
 1040 :
 1050 DEF PROCcoords
 1060 IF INKEY(-97) THEN PROCgrid
 1070 IF J%=0 PROCkeys:ENDPROC
 1080 IF J%=1 PROCstick ELSE PROCavstick
 1090 ENDPROC
 1100 :
 1110 DEF PROCstick
 1120 X%=4*(ADVAL(1)DIV206)-32
 1130 Y%=4*(256-ADVAL(2)DIV256)
 1140 hit%=-(ADVAL(0) AND 3)
 1150 ENDPROC
 1160 :
 1170 DEF PROCavstick
 1180 LOCAL ax%,ay%,n%
 1190 FOR n%=0 TO 4
 1200 PROCstick
 1210 ax%=ax%+X%:ay%=ay%+Y%
 1220 NEXT
 1230 X%=ax% DIV5:Y%=ay% DIV5
 1240 ENDPROC
 1250 :
 1260 DEF PROCkeys
 1270 step%=4+(-36*INKEY(-1))
 1280 X%=X%+step%*(INKEY(-26)-INKEY(-122
))
 1290 Y%=Y%+step%*(INKEY(-42)-INKEY(-58)
)
 1300 hit%=INKEY(-99)
 1310 IF X%<0 X%=0
 1320 IF X%>1248 X%=1248
 1330 IF Y%<0 Y%=0
 1340 IF Y%>1023 Y%=1023
 1350 ENDPROC
 1360 :
 1370 DEF PROCcursor(c%,cc%)
 1380 GCOL4,3
 1390 PROCcoords
 1400 *FX 19
 1410 VDU 25,4,X%;Y%;c%,cc%
 1420 *FX 19
 1430 VDU 25,4,X%;Y%;c%,cc%
 1440 ENDPROC
 1450 :
 1460 DEF PROCgrid
 1470 LOCAL a%,u%
 1480 FOR a%=R% TO 1279 STEP W%
 1490 FOR u%=S% TO 1023 STEP H%
 1500 PLOT 70,a%,u%
 1510 NEXT u%,a%
 1520 ENDPROC
 1530 :
 1540 DEF PROCbrushes(cr%,crx%,br%,brx%)
 1550 REPEAT
 1560 REPEAT
 1570 PROCcursor(cr%,crx%):K%=INKEY(1)
 1580 IF hit% PROCstroke(br%,brx%)
 1590 UNTIL K%>199
 1600 IF K%<205 THEN ON K%-199 GOSUB 300
,310,320,330,350
 1610 UNTIL K%>204
 1620 ENDPROC
 1630 :
 1640 DEF PROCstroke(b%,bb%)
 1650 GCOL B%,A%
 1660 REPEAT
 1670 PROCcoords
 1680 VDU 25,4,X%;Y%;b%,bb%
 1690 UNTIL NOT hit%
 1700 ENDPROC
 1710 :
 1720 DEF PROCprt(s$)
 1730 LOCAL c%
 1740 VDU 4,12
 1750 REPEAT
 1760 c%=28
```

Continued ►

◄ Freehand listing 2 continued

```
1770 REPEAT
1780 c%=c%-1
1790 UNTIL MID$(s$,c%,1)=" " OR MID$(s$
,c%,1)=""
1800 PRINT'LEFT$(s$,c%-1);
1810 s$=MID$(s$,c%+1)
1820 UNTIL s$=""
1830 VDU 5:ENDPROC
1840 :
1850 DEF FNinput(q$)
1860 PROCprt(q$):VDU 4
1870 INPUT LINE a$:VDU 5
1880 =a$
1890 :
1900 DEF FNget(q$)
1910 LOCAL t%
1920 PROCprt(q$)
1930 t%=GET
1940 IF t%>90 THEN t%=t%-32
1950 =CHR$(t%)
1960 :
1970 DEF PROCbox(xs%,ys%)
1980 PLOT 26,0,ys%:PLOT 26,xs%,0
1990 PLOT 26,0,-ys%:PLOT 26,-xs%,0
2000 ENDPROC
2010 :
2020 DEF PROChalfbox(x%,y%)
2030 MOVE x%,1023:PLOT 30,x%,y%
2040 PLOT 30,1279,y%:MOVE x%,y%
2050 ENDPROC
2060 :
2070 DEF PROCstatus
2080 VDU 28,29,31,39,29,4,12
2090 PRINT"COL ";A%;
2100 IF J%=0 PRINT" K" ELSE IF J%=1 PRI
NT" J(Q)" ELSE PRINT" J(S)"
2110 PRINT "(";$(D%+&20+A%*&8);")"
2120 PRINT"USE: ";$(D%+B%*&6);
2130 VDU 28,0,31,28,29,5
2140 ENDPROC
2150 :
2160 DEF PROCovmenu
2170 IF K%>219 THEN PROCctrled ELSE PRO
Cshfted
2180  ENDPROC
2190 :
2200 DEF PROCctrled
2210 IF K%<223 THEN PROCovly("CTUTILS")
:ENDPROC
2220 K%=0:ENDPROC
2230 :
2240 DEF PROCshfted
2250 IF K%<213 THEN PROCovly("SHUTILS")
:ENDPROC
2260 K%=0:ENDPROC
2270 :
2280 DEF PROCoscli(S$)
2290 $(D%+&D0)=S$
2300 x%=X%:y%=Y%
2310 Y%=9:X%=&D0:CALL &FFF7
2320 X%=x%:Y%=y%
2330 ENDPROC
2340 :
2350 DEF PROCovly(f$)
2360 IF f$=$F% THEN 10000 ELSE $F%=f$
2370 PROCprt("Loading overlay "+f$)
2380 PROCoscli("LOAD :0.O."+f$+" "+STR$
~(T%-2))
```

Listing 3. Shift utilities for use with *Freehand*

```
10000 REM O.SHUTILS
10010 REM Shift Utilities
10020 IF K%=210 THEN PROCpose
10030 IF K%=211 THEN PROCdefcol
10040 IF K%=212 THEN PROCdefgrid
10050 ENDPROC
```

Continued ►

◄ Continued

```
10060 :
10070 DEF PROCpose
10080 VDU 4
10090 VDU 28,0,31,39,29
10100 VDU 12
10110 VDU 28,0,31,39,0
10120 VDU 30,11,11
10130 VDU 23,1,0;0;0;0;
10140 K%=GET
10150 VDU 23,1,1;0;0;0;
10160 FOR c%=0 TO 32:VDU10:NEXT c%
10170 PROCstatus
10180 ENDPROC
10190 :
10200 DEF PROCdefcol
10210 PROCprt("Redefine present colour b
y moving cursor.")
10220 REPEAT
10230 PROCcoords
10240 nc%=X% DIV 82
10250 VDU 19,A%,nc%,0,0,0
10260 $(D%+&20+A%*&8)=$(D%+&40+nc%*&8)
10270 PROCstatus
10280 UNTIL hit%
10290 K%=0
10300 ENDPROC
10310 :
10320 DEF PROCdefgrid
10330 PROCprt("Define grid ... touch a n
ew grid point")
10340 REPEAT
10350 PROCcoords
10360 PROCcross(X%,Y%):PROCcross(X%,Y%)
10370 UNTIL hit%
10380 PROCcross(X%,Y%)
10390 bx%=X%:by%=Y%
10400 :
10410 PROCprt("Now touch the point above
 and to the right of it")
10420 REPEAT
10430 REPEAT
10440 PROCcoords
10450 PROCcross(X%,Y%):PROCcross(X%,Y%)
10460 UNTIL hit%
10470 UNTIL X%>bx% AND Y%>by%
10480 PROCcross(X%,Y%)
10490 :
10500 W%=X%-bx%
10510 H%=Y%-by%
10520 R%=bx% MOD W%
10530 S%=by% MOD H%
10540 :
10550 PROCcross(bx%,by%)
10560 PROCcross(X%,Y%)
10570 :
10580 PROCgrid
10590 K%=0
10600 ENDPROC
10610 :
10620 DEF PROCcross(x%,y%)
10630 MOVE x%,100
10640 PLOT 22,x%,1023
10650 MOVE 0,y%
10660 PLOT 22,1279,y%
10670 ENDPROC
```

Listing 4. Control utilities to use with *Freehand*

```
10000 REM O.CTUTILS
10010 REM Control Utilities
10020 IF K%=220 THEN PROCsave
10030 IF K%=221 THEN PROCcoms
10040 IF K%=222 THEN PROCload
10050 K%=0
10060 ENDPROC
10070 :
10080 DEF PROCsave
10090 LOCAL pn$
```

Continued ►

See 'Stylish symmetry', page 72

Running "Paint" on a cassette-based system:

PAINT was designed with a disc-based system in mind, making use of overlays to cram all the facilities into the memory. The program can be converted to run on a cassette-based system fairly easily by including the overlays in the main program itself. With PAGE set to &E00 there will be sufficient space for both overlays to be contained in the memory simultaneously. Here are the changes required:

- Replace line 280 in PAINT with:

  280 VDU 4

- Replace line 2360 in P2 with:

  2360 IF f$="CTUTILS" GOTO 9000 ELSE GOTO 10000

- Delete lines 2370 and 2380 from P2
- Enter "O.SHUTILS" as part of P2, starting with line number 9000
- Enter "O.CTUTILS" as part of P2, starting with line number 10000

◄ Freehand listing 4 continued

```
10100 pn$=FNname("Name for screen to be
saved as")
10110 PROCoscli("SAVE P."+pn$+" 3000 7FF
F")
10120 PROCsavepal(pn$)
10130 ENDPROC
10140 :
10150 DEF PROCload
10160 LOCAL pn$
10170 pn$=FNname("Name of screen to be l
oaded")
10180 PROCoscli("LOAD P."+pn$)
10190 PROCloadpal(pn$)
10200 PROCstatus
10210 ENDPROC
10220 :
10230 DEF FNname(p$)
10240 LOCAL n$
10250 REPEAT
10260 REPEAT
10270 n$=FNinput(p$)
10280 UNTIL LEN(n$)>0 AND LEN(n$)<8
10290 UNTIL INSTR(n$," ")=FALSE AND INST
R(n$,".")=FALSE AND INSTR(n$,":")=FALSE
AND INSTR(n$,"*")=FALSE
10300 =n$
10310 :
10320 DEF PROCcoms
10330 REPEAT
10340 s$=FNinput("Type O.S. command or <
RETURN> to continue ")
10350 PROCoscli(s$)
10360 UNTIL s$=""
10370 ENDPROC
10380 :
10390 DEFPROCsavepal(name$)
10400 DIM loc% 5
10410 a%=A%:c%=C%:x%=X%:y%=Y%
10420 osword%=&FFF1
10430 Y%=loc% DIV 256
10440 X%=loc% MOD 256
10450 A%=&0B
10460 C%=&00
10470 f%=OPENOUT("C."+name$)
10480 FOR j%=0 TO 3
10490 ?loc%=j%
10500 CALL osword%
```

Continued ►

◄ Continued

```
10510 BPUT#f%,?loc%
10520 BPUT#f%,loc%?1
10530 NEXT j%
10540 CLOSE#f%
10550 A%=a%:C%=c%:X%=x%:Y%=y%
10560 ENDPROC
10570 :
10580 DEFPROCloadpal(name$)
10590 f%=OPENIN("C."+name$)
10600 FOR c%=0 TO 3
10610 cn%=BGET#f%
10620 cv%=BGET#f%
10630 VDU 19,cn%,cv%,0,0,0
10640 $(D%+&20+cn%*&8)=$(D%+&40+cv%*&8)
10650 NEXT
10660 CLOSE#f%
10670 ENDPROC
```

Listing 1. Produces pattern 1 in figure 4 on page 75

```
 10 REM Program 1 - produces network
 20 REM pattern 1 in figure 4
 30 REM (c) Acorn User October 1985
 40 :
 50 MODE 0
 60 FOR xx = 100 TO 900 STEP 200
 70 skew=0
 80 FOR yy = 250 TO 750 STEP 100
 90 skew=skew+30
100 PROCdrawmotifat(xx+skew,yy)
110 NEXT yy
120 NEXT xx
130 END
140 :
150 DEF PROCdrawmotifat(xx,yy)
160 RESTORE
170 VDU 29,xx;yy;
180 FOR point = 1 TO 4
190 READ plotop,x,y
200 PLOT plotop,x,y
210 NEXT point
220 ENDPROC
230 :
240 DATA 4,-20,-10,5,+20,-10
250 DATA 5,20,10,5,-20,-10
```

Listing 2. Gives pattern 2 in figure 4

```
 10 REM Program 2 - produces network
 20 REM pattern 2 from figure 4
 30 REM (c) Acorn User October 1985
 40 :
 50 MODE 0
 60 type=1
 70 FOR xx = 100 TO 900 STEP 200
 80 FOR yy = 250 TO 750 STEP 100
 90 PROCdrawmotifat(xx,yy)
100 NEXT yy
110 NEXT xx
120 type=2
130 FOR xx = 200 TO 950 STEP 200
140 FOR yy = 300 TO 800 STEP 100
150 PROCdrawmotifat(xx,yy)
160 NEXT yy
170 NEXT xx
180 END
190 :
200 DEF PROCdrawmotifat(xx,yy)
210 VDU 29,xx;yy;
220 RESTORE
230 FOR point = 1 TO 4
240 READ plotop,x,y
250 IF type=2 THEN PROCtransform(1,0,0
,0,-1,0)
```

Continued ►

◀ McGregor & Watt's listing 2 continued

```
260 PLOT plotop,x,y
270 NEXT point
280 ENDPROC
290 :
300 DEF PROCtransform(a,b,c,d,e,f)
310 xt=a*x+b*y+c:yt=d*x+e*y+f
320 x=xt:y=yt
330 ENDPROC
340 :
350 DATA 4,-20,-10,5,+20,-10
360 DATA 5,20,10,5,-20,-10
```

Listing 3. Changes to make to listing 2 to get pattern 3 in figure 4

```
  0 REM To obtain program 3 from 2
  1 REM type in the following:
130 FOR xx = 120 TO 950 STEP 200
140 FOR yy = 270 TO 800 STEP 100
250 IF type=2 THEN PROCtransform(-1,0,
0,0,-1,0)
```

Listing 4. Pattern 4 in figure 4

```
 10 REM Program 4 - produces network
 20 REM pattern like no. 4 in fig. 4
 30 REM (c) Acorn User October 1985
 40 :
 50 MODE 0
 60 type=1
 70 FOR xx = 100 TO 900 STEP 400
 80 FOR yy = 250 TO 750 STEP 200
 90 PROCdrawmotifat(xx,yy)
100 NEXT yy
110 NEXT xx
120 type=2
130 FOR xx = 140 TO 940 STEP 400
140 FOR yy = 270 TO 800 STEP 200
150 PROCdrawmotifat(xx,yy)
160 NEXT yy
170 NEXT xx
180 type=3
190 FOR xx = 300 TO 900 STEP 400
200 FOR yy = 350 TO 750 STEP 200
210 PROCdrawmotifat(xx,yy)
220 NEXT yy
230 NEXT xx
240 type=4
250 FOR xx = 340 TO 900 STEP 400
260 FOR yy = 330 TO 770 STEP 200
270 PROCdrawmotifat(xx,yy)
280 NEXT yy
290 NEXT xx
300 END
310 :
320 DEF PROCdrawmotifat(xx,yy)
330 VDU 29,xx;yy;
340 RESTORE
350 FOR point = 1 TO 4
360 READ plotop,x,y
370 IF type=2 THEN PROCtransform(-1,0,
0,0,-1,0)
380 IF type=3 THEN PROCtransform(1,0,0
,0,-1,0)
390 IF type=4 THEN PROCtransform(-1,0,
0,0,1,0)
400 PLOT plotop,x,y
410 NEXT point
420 ENDPROC
430 :
440 DEF PROCtransform(a,b,c,d,e,f)
450 xt=a*x+b*y+c:yt=d*x+e*y+f
460 x=xt:y=yt
470 ENDPROC
480 :
490 DATA 4,-20,-10,5,+20,-10
500 DATA 5,20,10,5,-20,-10
```

Listing 5. Changes to make to listing 4 to get pattern 5 in figure 4

```
  0 REM To obtain program 5 from 4
  1 REM type in the following:
190 FOR xx = 300 TO 1100 STEP 400
200 FOR yy = 270 TO 750 STEP 200
250 FOR xx = 340 TO 1140 STEP 400
260 FOR yy = 250 TO 770 STEP 200
```

Listing 6. Gives pattern 6 in figure 4

```
 10 REM Program 6 - produces network
 20 REM pattern 6 in figure 4
 30 REM (c) Acorn User October 1985
 40 :
 50 MODE 0
 60 FOR type = 1 TO 2
 70 FOR xx = 100 TO 900 STEP 200
 80 skew=0
 90 FOR yy = 250 TO 750 STEP 100
100 IF yy=350 OR yy=550 OR yy=750 THEN
skew=100
110 PROCdrawmotifat(xx+skew,yy)
120 skew=0
130 NEXT yy
140 NEXT xx
150 NEXT type
160 END
170 :
180 DEF PROCdrawmotifat(xx,yy)
190 VDU 29,xx;yy;
200 RESTORE
210 FOR point = 1 TO 4
220 READ plotop,x,y
230 IF type=2 THEN PROCtransform(1,0,0
,0,-1,-20)
240 PLOT plotop,x,y
250 NEXT point
260 ENDPROC
270 :
280 DEF PROCtransform(a,b,c,d,e,f)
290 xt=a*x+b*y+c:yt=d*x+e*y+f
300 x=xt:y=yt
310 ENDPROC
320 :
330 DATA 4,-20,-10,5,+20,-10
340 DATA 5,20,10,5,-20,-10
```

Listing 7. Changes to make to listing 6 to get pattern 7 in figure 4

```
  0 REM To obtain program 7 from 6
  1 REM type in the following:
 80 :
100 :
110 PROCdrawmotifat(xx,yy)
120 :
```

Listing 8. Changes to make to listing 6 to get pattern 8

```
  1 REM To obtain program 8 from 6
  2 REM type in the following:
232 IF type=3 THEN PROCtransform(-1,0,
40,0,1,0)
234 IF type=4 THEN PROCtransform(-1,0,
40,0,-1,-20)
```

Listing 9. Changes to make to listing 6 to get pattern 9

```
  0 REM To obtain program 9 from 6
  1 REM type in the following:
```

Continued ▶

◀ *McGregor & Watt's listing 9 continued*

```
  70 FOR xx = 200 TO 1000 STEP 200
  80 :
 100 :
 110 PROCdrawmotifat(xx,yy)
 151 FOR type = 3 TO 4
 152 FOR xx = 150 TO 950 STEP 200
 153 FOR yy = 250 TO 750 STEP 100
 154 PROCdrawmotifat(xx,yy)
 155 NEXT yy
 156 NEXT xx
 157 NEXT type
 230 IF type=2 THEN PROCtransform(1,0,0
,0,-1,-30)
 232 IF type=3 THEN PROCtransform(-1,0,
0,0,1,0)
 234 IF type=4 THEN PROCtransform(-1,0,
0,0,-1,-30)
```


Listing 10. Changes to make to listing 6 to get pattern 10

```
   0 REM To obtain program 10 from 6
   1 REM type in the following:
  60 FOR type = 1 TO 4
  80 :
  90 FOR yy = 250 TO 750 STEP 130
 100 :
 110 PROCdrawmotifat(xx,yy)
 120 :
 230 IF type=2 THEN PROCtransform(-1,0,
-50,0,-1,-20)
 232 IF type=3 THEN PROCtransform(0,1,-
10,-1,0,-40)
 234 IF type=4 THEN PROCtransform(0,-1,
-40,1,0,20)
```

Listing 11. Gives pattern 11 in figure 4

```
  10 REM Program 11 - produces network
  20 REM pattern 11 in figure 4
  30 REM (c) Acorn User October 1985
  40 :
  50 MODE 0
  60 FOR type = 1 TO 4
  70 FOR xx = 100 TO 900 STEP 400
  80 FOR yy = 250 TO 750 STEP 260
  90 PROCdrawmotifat(xx,yy)
 100 NEXT yy
 110 NEXT xx
 120 NEXT type
 130 FOR type = 5 TO 8
 140 FOR xx = 300 TO 900 STEP 400
 150 FOR yy = 380 TO 750 STEP 260
 160 PROCdrawmotifat(xx,yy)
 170 NEXT yy
 180 NEXT xx
 190 NEXT type
 200 END
 210 :
 220 DEF PROCdrawmotifat(xx,yy)
 230 VDU 29,xx;yy;
 240 RESTORE
 250 FOR point = 1 TO 4
 260 READ plotop,x,y
 270 IF type=1 THEN PROCtransform(1,0,0
,0,1,10)
 280 IF type=2 THEN PROCtransform(-1,0,
-50,0,-1,-20)
 290 IF type=3 THEN PROCtransform(0,1,-
10,-1,0,-40)
 300 IF type=4 THEN PROCtransform(0,-1,
-40,1,0,20)
 310 IF type=5 THEN PROCtransform(-1,0,
-50,0,1,10)
 320 IF type=6 THEN PROCtransform(0,-1,
```

Continued ▶

◀ *Continued*

```
-40,-1,0,-40)
 330 IF type=7 THEN PROCtransform(0,1,-
10,1,0,20)
 340 IF type=8 THEN PROCtransform(1,0,0
,0,-1,-20)
 350 PLOT plotop,x,y
 360 NEXT point
 370 ENDPROC
 380 :
 390 DEF PROCtransform(a,b,c,d,e,f)
 400 xt=a*x+b*y+c:yt=d*x+e*y+f
 410 x=xt:y=yt
 420 ENDPROC
 430 :
 440 DATA 4,-20,-10,5,+20,-10
 450 DATA 5,20,10,5,-20,-10
```

Listing 12. Changes to make to listing 11 to get pattern 12

```
   1 REM To obtain program 12 from 11
   2 REM type in the following:
  60 FOR type = 1 TO 8
  70 FOR xx = 100 TO 900 STEP 200
  80 FOR yy = 250 TO 750 STEP 130
 130 END
```

Listing 13. Produces pattern 13 in figure 4

```
  10 REM Program 13 - produces network
  20 REM pattern 13 in figure 4
  30 REM (c) Acorn User October 1985
  40 :
  50 MODE 0
  60 FOR type = 1 TO 3
  70 FOR yy = 250 TO 750 STEP 120
  80 skew=0
  90 IF yy=370 OR yy=610 THEN skew=60
 100 FOR xx = 100 TO 700 STEP 120
 110 PROCdrawmotifat(xx+skew,yy)
 120 NEXT xx
 130 NEXT yy
 140 NEXT type
 150 END
 160 :
 170 DEF PROCdrawmotifat(xx,yy)
 180 VDU 29,xx;yy;
 190 RESTORE
 200 FOR point = 1 TO 4
 210 READ plotop,x,y
 220 IF type=1 THEN PROCtransform(1,0,0
,0,-1,0)
 230 IF type=2 THEN PROCtransform(-.5,-
.866,0,-.866,0.5,0)
 240 IF type=3 THEN PROCtransform(-.5,.
866,0,.866,0.5,0)
 250 PLOT plotop,x,y
 260 NEXT point
 270 ENDPROC
 280 :
 290 DEF PROCtransform(a,b,c,d,e,f)
 300 xt=a*x+b*y+c:yt=d*x+e*y+f
 310 x=xt:y=yt
 320 ENDPROC
 330 :
 340 DATA 4,5,5,5,39.64,5
 350 DATA 5,39.64,25,5,5,5
```

Listing 14. Changes to make to listing 13 to get pattern 14

```
   1 REM To obtain program 14 from 13
   2 REM type in the following:
```

Continued ▶

◀ McGregor & Watt's listing 14 continued

```
   60 FOR type = 1 TO 6
  220 IF type=1 THEN PROCtransform(1,0,0
,0,1,0)
  230 IF type=2 THEN PROCtransform(1,0,0
,0,-1,0)
  240 IF type=3 THEN PROCtransform(-.5,-
.866,0,.866,-0.5,0)
  241 IF type=4 THEN PROCtransform(-.5,.
866,0,-.866,-0.5,0)
  242 IF type=5 THEN PROCtransform(-.5,-
.866,0,-.866,0.5,0)
  243 IF type=6 THEN PROCtransform(-.5,.
866,0,.866,0.5,0)
```

Listing 15. Changes to make to listing 14 to get pattern 15

```
    1 REM To obtain program 15 from 14
    2 REM type in the following:
   70 FOR yy = 250 TO 610 STEP 90
   90 IF yy=340 OR yy=520 THEN skew=50
  100 FOR xx = 100 TO 700 STEP 100
  220 IF type=1 THEN PROCtransform(0,1,0
,-1,0,0)
  230 IF type=2 THEN PROCtransform(0,-1,
0,-1,0,0)
  240 IF type=3 THEN PROCtransform(.866,
-.5,0,.5,.866,0)
  241 IF type=4 THEN PROCtransform(.866,
.5,0,.5,-.866,0)
  242 IF type=5 THEN PROCtransform(-.866
,-.5,0,.5,-.866,0)
  243 IF type=6 THEN PROCtransform(-.866
,.5,0,.5,.866,0)
```

Listing 16. Changes to make to listing 15 to get pattern 16

```
    1 REM To obtain program 16 from 15
    2 REM type in the following:
   70 FOR yy = 250 TO 850 STEP 120
   90 IF yy=370 OR yy=610 OR yy=850 THEN
 skew=206
  100 FOR xx = 100 TO 1000 STEP 412
  220 IF type=1 THEN PROCtransform(1,0,0
,0,1,0)
  230 IF type=2 THEN PROCtransform(.5,-.
866,0,.866,0.5,0)
  240 IF type=3 THEN PROCtransform(-.5,-
.866,0,.866,-.5,0)
  241 IF type=4 THEN PROCtransform(-1,0,
0,0,-1,0)
  242 IF type=5 THEN PROCtransform(-.5,.
866,0,-.866,-.5,0)
  243 IF type=6 THEN PROCtransform(.5,.8
66,0,-.866,0.5,0)
  340 DATA 4,16,-4,5,64,-4
  350 DATA 5,64,-32,5,16,-4
```

Listing 17. Changes to make to listing 16 to get pattern 17

```
    1 REM To obtain program 17 from 16
    2 REM type in the following:
   60 FOR type = 1 TO 12
   70 FOR yy = 250 TO 850 STEP 240
   90 IF yy=490 THEN skew=150
  100 FOR xx = 100 TO 1000 STEP 300
  230 IF type=2 THEN PROCtransform(1,0,0
,0,-1,0)
  240 IF type=3 THEN PROCtransform(.5,-.
866,0,.866,0.5,0)
  241 IF type=4 THEN PROCtransform(.5,.8
66,0,.866,-0.5,0)
  242 IF type=5 THEN PROCtransform(-.5,-
```

Continued ▶

◀ Continued

```
.866,0,.866,-0.5,0)
  243 IF type=6 THEN PROCtransform(-.5,.
866,0,.866,.5,0)
  244 IF type=7 THEN PROCtransform(-1,0,
0,0,-1,0)
  245 IF type=8 THEN PROCtransform(-1,0,
0,0,1,0)
  246 IF type=9 THEN PROCtransform(-.5,.
866,0,-.866,-0.5,0)
  247 IF type=10 THEN PROCtransform(-.5,
-.866,0,-.866,.5,0)
  248 IF type=11 THEN PROCtransform(.5,.
866,0,-.866,.5,0)
  249 IF type=12 THEN PROCtransform(0.5,
-.866,0,-.866,-.5,0)
  340 DATA 4,24,-6,5,96,-6
  350 DATA 5,96,-42,5,24,-6
```

Listing 18. Generates the rhinoceros demonstration in figure 5(d) on page 76

```
   10 REM Program 18
   20 REM (c) Acorn User October 1985
   30 :
   40 MODE 0
   50 FOR type = 1 TO 2
   60 FOR xx = 100 TO 850 STEP 250
   70 FOR yy = 250 TO 850 STEP 200
   80 PROCdrawmotifat(xx,yy)
   90 NEXT yy
  100 NEXT xx
  110 NEXT type
  120 END
  130 :
  140 DEF PROCdrawmotifat(xx,yy)
  150 VDU 29,xx;yy;
  160 RESTORE
  170 FOR point = 1 TO 147
  180 READ plotop,x,y
  190 x=x/5:y=y/5
  200 IF type=2 THEN PROCtransform(1,0,0
,0,-1,-105)
  210 PLOT plotop,x,y
  220 NEXT point
  230 ENDPROC
  240 :
  250 DEF PROCtransform(a,b,c,d,e,f)
  260 xt=a*x+b*y+c:yt=d*x+e*y+f
  270 x=xt:y=yt
  280 ENDPROC
  290 :
  300 DATA 4,-412,88,5,-408,68,5,-404
  310 DATA 40,5,-376,-4,5,-384,-32,5
  320 DATA -376,-60,5,-368,-68,5,-360
  330 DATA -68,5,-356,-64,5,-340,-68
  340 DATA 5,-316,-56,5,-304,-56,5,-284
  350 DATA -60,5,-232,-36,5,-216,-36,5
  360 DATA -204,-52,5,-192,-52,5,-180
  370 DATA -56,5,-180,-60,5,-152,-84
  380 DATA 5,-144,-108,5,-120,-148,5
  390 DATA -104,-184,5,-104,-188,5,-116
  400 DATA -224,5,-144,-244,5,-144,-248
  410 DATA 5,-120,-256,5,-88,-256,5,-64
  420 DATA -244,5,-68,-232,5,-76,-228
  430 DATA 5,-56,-188,5,-60,-164,5,-64
  440 DATA -160,5,-68,-136,5,-36,-176
  450 DATA 5,-36,-192,5,-40,-204,5,-60
  460 DATA -228,5,-44,-236,5,-16,-236
  470 DATA 5,8,-232,5,8,-224,5,0,-212
  480 DATA 5,0,-184,5,8,-160,5,-4,-140
  490 DATA 5,-16,-112,5,40,-120,5,104
  500 DATA -116,5,116,-132,5,128,-140
  510 DATA 5,128,-188,5,76,-216,5,76
  520 DATA -232,5,104,-236,5,144,-236
  530 DATA 5,148,-220,5,192,-164,5,184
  540 DATA -136,5,204,-144,5,220,-156
  550 DATA 5,236,-180,5,228,-232,5,204
  560 DATA -260,5,220,-268,5,252,-268,5
```

Continued ▶

See 'Day of the fractal', page 79

◀ *The rhinoceros (listing 18) continued*

```
570 DATA 288,-272,5,288,-244,5,280
580 DATA -232,5,292,-180,5,296,-156,5
590 DATA 288,-140,5,288,-116,5,280
600 DATA -112,5,280,-100,5,300,-76,5
610 DATA 308,-48,5,304,-96,5,304,-128
620 DATA 5,312,-136,5,320,-124,5,312
630 DATA -88,5,312,-72,5,316,-20,5
640 DATA 308,32,5,300,48,5,296,68,5
650 DATA 224,116,5,192,124,5,176,124
660 DATA 5,72,104,5,-8,112,5,-80,136
670 DATA 5,-124,116,5,-132,120,5,-152
680 DATA 116,5,-172,100,5,-172,116,5
690 DATA -184,140,5,-204,124,5,-208
700 DATA 104,5,-212,92,5,-224,88,5
710 DATA -232,76,5,-256,56,5,-268,56
720 DATA 5,-276,48,5,-300,84,5,-320
730 DATA 88,5,-320,40,5,-348,28,5
740 DATA -364,40,5,-380,60,5,-404,100
750 DATA 5,-412,92,5,-412,84,5,-408
760 DATA 80,4,104,-4,5,132,-72,5,160
770 DATA -108,5,204,-144,5,220,-152,4
780 DATA 156,-104,5,140,-112,5,120
790 DATA -116,5,104,-116,4,-16,-112,5
800 DATA -60,-96,5,-60,-104,5,-60
810 DATA -116,5,-68,-124,5,-68,-136,4
820 DATA -172,100,5,-180,84,5,-192,76
830 DATA 5,-208,72,5,-196,76,5,-188
840 DATA 84,5,-188,64,4,-292,16,5
850 DATA -284,20,5,-280,16,5,-292,16
860 DATA 5,-284,20,5,-280,16
```

Listing 19. The daffodil motif

```
 10 REM Program 19
 20 REM (c) Acorn User October 1985
 30 :
 40 MODE 0
 50 FOR type = 1 TO 3
 60 FOR yy = 250 TO 850 STEP 150
 70 skew=0
 80 IF yy=400 OR yy=700 THEN skew=88
 90 FOR xx = 100 TO 975 STEP 175
100 PROCdrawmotifat(xx+skew,yy)
110 NEXT xx
120 NEXT yy
130 NEXT type
140 END
150 :
160 DEF PROCdrawmotifat(xx,yy)
170 VDU 29,xx;yy;
180 RESTORE
190 FOR point = 1 TO 148
200 READ plotop,x,y
210 x=x/10:y=y/10+50
220 IF type=1 THEN PROCtransform(1,0,0
,0,-1,0)
230 IF type=2 THEN PROCtransform(-.5,-
.866,0,-.866,.5,0)
240 IF type=3 THEN PROCtransform(-.5,.
866,0,.866,0.5,0)
250 PLOT plotop,x,y
260 NEXT point
270 ENDPROC
280 :
290 DEF PROCtransform(a,b,c,d,e,f)
300 xt=a*x+b*y+c:yt=d*x+e*y+f
310 x=xt:y=yt
320 ENDPROC
330 :
340 DATA 4,-32,-492,5,-64,-440,5,-64
350 DATA -108,5,-88,-108,5,-196,-64,5
360 DATA -232,-40,5,-248,-16,5,-252
370 DATA 32,5,-216,76,5,-192,88,5
380 DATA -168,92,5,-144,88,5,-116,80
390 DATA 5,-92,76,5,-148,136,5,-184
400 DATA 200,5,-200,252,5,-200,268,5
410 DATA -188,272,5,-160,268,5,-116
```

Continued ▶

◀ *Continued*

```
420 DATA 256,5,-48,224,5,-20,204,5,-8
430 DATA 240,5,8,264,5,32,288,5,48
440 DATA 296,5,68,280,5,84,260,5,96
450 DATA 236,5,104,240,5,112,240,5
460 DATA 120,224,5,128,220,5,132,232
470 DATA 5,136,224,5,140,228,5,148
480 DATA 216,5,156,224,5,164,224,5
490 DATA 168,216,5,176,220,5,184,208
500 DATA 5,184,196,5,188,184,5,208
510 DATA 192,5,212,176,5,220,180,5
520 DATA 220,152,5,228,156,5,240,148
530 DATA 5,248,136,5,248,112,5,256
540 DATA 112,5,260,108,5,248,84,5
550 DATA 252,76,5,244,76,5,232,64,5
560 DATA 236,56,5,228,44,5,220,40,5
570 DATA 224,52,5,208,48,5,204,40,5
580 DATA 192,32,5,216,28,5,280,-20,5
590 DATA 304,-48,5,320,-84,5,328,-112
600 DATA 5,292,-136,5,236,-148,5,184
610 DATA -144,5,160,-132,5,160,-144,5
620 DATA 120,-164,5,44,-236,5,12,-220
630 DATA 5,-24,-192,5,-28,-496,4,96
640 DATA 240,5,88,228,5,80,232,5,76
650 DATA 228,5,68,232,5,44,216,5,48
660 DATA 212,5,24,196,5,28,188,5,20
670 DATA 168,5,28,172,5,36,168,5,28
680 DATA 144,5,32,136,5,44,140,5,56
690 DATA 136,5,56,104,5,60,100,5,72
700 DATA 108,5,84,100,5,84,92,5,80,76
710 DATA 5,88,76,5,104,64,5,112,72,5
720 DATA 124,76,5,136,72,5,136,64,5
730 DATA 144,64,5,140,48,5,136,44,5
740 DATA 148,48,5,152,40,5,168,52,5
750 DATA 180,32,5,192,32,5,196,36,4
760 DATA 168,44,5,72,-40,5,44,-36,5
770 DATA 16,-24,5,0,4,5,-4,36,5,20,84
780 DATA 5,40,136,4,64,-40,5,104,-48
790 DATA 5,128,-64,5,152,-96,5,160
800 DATA -116,5,160,-140,4,-60,-140,5
810 DATA -24,-192,4,8,-20,5,-4,-64,5
820 DATA 0,-88,5,-44,-116,5,-68,-108
830 DATA 4,-8,16,5,-36,44,5,-100,76,4
840 DATA -20,204,5,4,168,5,16,144,5
850 DATA 24,116,5,24,104,5,28,100
```

Listing 1. Kim Aldis' fractal generator

```
 10 REM Fractal Generator
 20 REM by Kim Aldis
 30 REM for BBC B/B+ and Electron
 40 REM (c) Acorn User October 1985
 50 :
 60 ON ERROR GOTO 2400
 70 *KEY0*FX4,0|M*FX12,10|M
 80 MODE0:VDU23;8202;0;0;0;
 90 PROCinit
100 FOR I%=1 TO 30:mirr%(I%)=0:NEXT
110 PROCinstr
120 PROCoption
130 END
140 :
150 DEF PROCgenerator
160 PROCgrid(100,0,900,990)
170 X%=0:Y%=0:P%=0:Q%=0
180 D%=100:E%=500:I%=1
190 REPEAT
200 PROCrband
210 IF K%=127 GOTO 280
220 xgenst(I%)=V%/800
230 ygenst(I%)=W%/800
240 xgenend(I%)=X%/800
250 ygenend(I%)=Y%/800
260 IF mirr% mirr%(I%)=-1 ELSE mirr%(I
%)=1
270 I%=I%+1
280 UNTIL K%=127
```

Continued ▶

◀ *Fractal generator continued*

```
  290 npts%=I%-1
  300 ENDPROC
  310 :
  320 DEF PROCinit
  330 DIM xgenst(30),ygenst(30),xgenend(
30),ygenend(30),xinitst(30),yinitst(30),
xinitend(30),yinitend(30),mirr%(30),oscl
i% 20
  340 P%=0:Q%=0:X%=0:Y%=0:dx%=2:dy%=4
  350 mirr%=FALSE:del$=STRING$(30," ")
  360 VDU23,242,0,0,0,0,0,0,0,&FF
  370 *FX 4,2
  380 *FX 12,1
  390 *FX 225,128
  400 *FX 226,144
  410 ENDPROC
  420 :
  430 DEF PROCrband
  440 PRINTTAB(70,I%+1);I%
  450 mirr%=FALSE
  460 GCOL4,1
  470 REPEAT
  480 K%=INKEY(0)
  490 *FX 15,0
  500 IF K%<>-1 PROCdraw
  510 IF K%=140 X%=X%-dx%
  520 IF K%=141 X%=X%+dx%
  530 IF K%=142 Y%=Y%-dy%
  540 IF K%=143 Y%=Y%+dy%
  550 IF K%=159 Q%=Q%+dy%
  560 IF K%=158 Q%=Q%-dy%
  570 IF K%=157 P%=P%+dx%
  580 IF K%=156 P%=P%-dx%
  590 IF K%=136 PROCkeyin
  600 IF K%=137 mirr%=NOT mirr%:PRINTTAB
(76,I%+1);CHR$242
  610 IF mirr% PRINTTAB(76,I%+1);"M"
  620 PROCcursor
  630 IF K%<>-1 PROCdraw:dx%=dx%+4:dy%=d
y%+2 ELSE dx%=2:dy%=4
  640 UNTIL K%=&0D OR K%=127
  650 V%=P%:W%=Q%:GCOL0,1:PROCdraw
  660 P%=X%:Q%=Y%
  670 ENDPROC
  680 :
  690 DEF PROCdraw
  700 MOVE P%+D%,Q%+E%:DRAW X%+D%,Y%+E%
  710 PROCcursor
  720 ENDPROC
  730 :
  740 DEF PROCcursor
  750 GCOL 4,1:FOR C%=1 TO 2
  760 MOVE X%+D%-20,Y%+E%
  770 DRAW X%+D%+20,Y%+E%
  780 MOVE X%+D%,Y%+E%+20
  790 DRAW X%+D%,Y%+E%-20
  800 NEXT
  810 ENDPROC
  820 :
  830 DEF PROCsplit(xs,ys,xe,ye,mirr%)
  840 LOCAL I%,xdiff,ydiff
  850 xdiff=xe-xs:ydiff=ye-ys
  860 N%=N%+1
  870 FOR I%=1 TO npts%
  880 Xs=xdiff*xgenst(I%)-ydiff*ygenst(I
%)*mirr%
  890 Ys=ydiff*xgenst(I%)+xdiff*ygenst(I
%)*mirr%
  900 Xe=xdiff*xgenend(I%)-ydiff*ygenend
(I%)*mirr%
  910 Ye=ydiff*xgenend(I%)+xdiff*ygenend
(I%)*mirr%
  920 xstart=xs+Xs:ystart=ys+Ys
  930 xend=xs+Xe:yend=ys+Ye
  940 IF N%=nrec% MOVE xstart,ystart:DRA
Wxend,yend ELSE PROCsplit(xstart,ystart,
xend,yend,mirr%(I%)*mirr%)
  950 IF INKEY(0)=32 N%=nrec%
  960 NEXT
```

Continued ▶

◀ *Continued*

```
  970 N%=N%-1
  980 ENDPROC
  990 :
 1000 DEF PROCgrid(X1%,Y1%,X2%,Y2%)
 1010 FOR A%=X1% TO X2% STEP 50
 1020 FOR B%=Y1% TO Y2% STEP 50
 1030 PLOT69,A%,B%
 1040 NEXT:NEXT
 1050 MOVE X2%,Y2%
 1060 DRAW X1%,Y2%:DRAW X1%,Y1%
 1070 DRAW X2%,Y1%:DRAW X2%,Y2%
 1080 MOVE (X2%+X1%)/2,Y2%
 1090 DRAW (X2%+X1%)/2,Y2%+8
 1100 MOVE (X2%+X1%)/2,Y1%
 1110 DRAW (X2%+X1%)/2,Y1%-8
 1120 MOVE X2%,(Y2%+Y1%)/2
 1130 DRAW X2%+8,(Y2%+Y1%)/2
 1140 MOVE X1%,(Y2%+Y1%)/2
 1150 DRAW X1%-8,(Y2%+Y1%)/2
 1160 PROCmenu
 1170 ENDPROC
 1180 :
 1190 DEF PROCsave(A$)
 1200 IF A$="G" PRINTTAB(26,29);"Save ge
nerator "; ELSE PRINTTAB(26,29);"Save In
itiator ";
 1210 INPUT"File ",sfile$
 1220 IF A$="G" sfile$="G."+sfile$ ELSE
sfile$="I."+sfile$
 1230 PRINTTAB(26,29);del$
 1240 f=OPENOUT(sfile$)
 1250 IF A$="G" PRINT#f,npts%:pts%=npts%
 ELSE PRINT#f,ninitpts%:pts%=ninitpts%
 1260 FOR I%=1 TO pts%
 1270 IF A$="G"PRINT#f,mirr%(I%),xgenst(
I%),ygenst(I%),xgenend(I%),ygenend(I%):E
LSE PRINT#f,xinitst(I%),yinitst(I%),xini
tend(I%),yinitend(I%)
 1280 NEXT
 1290 CLOSE#f
 1300 ENDPROC
 1310 :
 1320 DEF PROCload(A$)
 1330 IF A$="G" PRINTTAB(26,29);"Load Ge
nerator ";ELSE PRINTTAB(26,29);"Load Ini
tiator ";
 1340 INPUT"File ",file$
 1350 IF A$="G" file$="G."+file$ ELSE fi
le$="I."+file$
 1360 PRINTTAB(26,29);del$:VDU7
 1370 f=OPENUP(file$)
 1380 IF A$="G"INPUT#f,npts%:pts%=npts%
ELSE INPUT#f,ninitpts%:pts%=ninitpts%
 1390 FOR I%=1 TO pts%
 1400 IF A$="G"INPUT#f,mirr%(I%),xgenst(
I%),ygenst(I%),xgenend(I%),ygenend(I%) E
LSE INPUT#f,xinitst(I%),yinitst(I%),xini
tend(I%),yinitend(I%)
 1410 NEXT
 1420 CLOSE#f
 1430 ENDPROC
 1440 :
 1450 DEF PROCinitiator
 1460 PROCgrid(0,0,1000,990)
 1470 I%=1:D%=0:E%=0:X%=0
 1480 Y%=500:P%=0:Q%=500
 1490 REPEAT
 1500 PROCrband
 1510 IF K%=127 GOTO 1550
 1520 xinitst(I%)=V%+100:yinitst(I%)=W%
 1530 xinitend(I%)=X%+100:yinitend(I%)=Y
%
 1540 I%=I%+1
 1550 UNTIL K%=127
 1560 ninitpts%=I%-1
 1570 ENDPROC
 1580 :
 1590 DEF PROCmenu
 1600 MOVE 1079,0:DRAW 1079,960
```

Continued ▶

◀ Fractal generator continued

```
1610 MOVE 1279,0:DRAW 1279,960
1620 MOVE 1179,0:DRAW 1179,960
1630 FOR I%=0 TO 960 STEP 32
1640 MOVE 1079,I%:DRAW 1279,I%
1650 NEXT
1660 ENDPROC
1670 :
1680 DEF PROCoption
1690 REPEAT
1700 REPEAT:K%=INKEY(0)
1710 IF K%=ASC"*" PROCosc
1720 UNTIL K%>=128 AND K%<=137
1730 ON K%-127 GOSUB 1750,1760,1770,178
0,1790,1800,1810,1870,1880,1880
1740 UNTIL FALSE
1750 PROCsave("G"):RETURN
1760 PROCload("G"):RETURN
1770 PROCsave("I"):RETURN
1780 PROCload("I"):RETURN
1790 CLS:PROCgenerator:RETURN
1800 CLS:PROCinitiator:RETURN
1810 INPUTTAB(60,0)"Recursion Depth ",n
rec%
1820 N%=0:GCOLO,1:CLS
1830 IF nrec%>9 OR nrec%<=0 PRINTTAB(60
,0)"Out of range       ":VDU7
1840 FOR H%=1 TO ninitpts%
1850 PROCsplit(xinitst(H%),yinitst(H%),
xinitend(H%),yinitend(H%),1)
1860 NEXT:VDU7,7:RETURN
1870 PROCuser
1880 RETURN
1890 UNTIL FALSE
1900 ENDPROC
1910 :
1920 DEF PROCkeyin
1930 A=1/3:B=SQR(3)
1940 PRINTTAB(10,0);del$:PRINTTAB(10,0)
;"?";:K%=-1
1950 PROCgetstring:A$=num$:IF ASC(E$)=1
36 ENDPROC
1960 PROCgetstring:B$=num$:IF ASC(E$)=1
36 ENDPROC
1970 PROCgetstring:C$=num$:IF ASC(E$)=1
36 ENDPROC
1980 PROCgetstring:D$=num$:IF ASC(E$)=1
36 ENDPROC
1990 R=EVAL(A$):S=EVAL(B$)
2000 T=EVAL(C$):U=EVAL(D$)
2010 P%=R*800:Q%=S*800
2020 X%=T*800:Y%=U*800:K%=&OD
2030 ENDPROC
2040 :
2050 DEF PROCosc
2060 VDU28,0,31,79,22,14,12
2070 INPUT"*"name$
2080 X%=oscli% MOD 256:Y%=oscli% DIV 25
6
2090 $oscli%=name$:CALL&FFF7
2100 VDU26,15
2110 ENDPROC
2120 :
2130 DEF PROCinstr
2140 VDU26,12
2150 FOR M%=0 TO 9
2160 READ opt$
2170 PRINTTAB(18,M%*2);"f";M%;" .......
...........  ";opt$
2180 NEXT
2190 PRINTTAB(25,25)"<Esc> Return to Me
nu"
2200 ENDPROC
2210 :
2220 DATA Save Generator, Load Generato
r,Save Initiator,Load Initiator
2230 DATA Define Generator,Define Initi
ator, Generate Fractal
2240 DATA User Print Dump,Toggle Numeri
c Input,Mirror Image
2250 :
```

Continued ▶

◀ Continued

```
2260 DEF PROCgetstring
2270 num$=""
2280 REPEAT
2290 RESTORE
2300 *FX 15,0
2310 E$=GET$:IF ASC(E$)=&D THEN 2350
2320 PRINT;E$;
2330 IF ASC(E$)=136 THEN 2350
2340 num$=num$+E$
2350 UNTIL ASC(E$)=&D OR ASC(E$)=136
2360 PRINT;" , ";
2370 ENDPROC
2380 :
2390 REM *** Error Handler ***
2400 IF ERR=17 GOTO 110
2410 PROCinstr
2420 PRINTTAB(0,28)"ERROR :":REPORT
2430 GOTO 120
2440 :
2450 DEFPROCuser:MOVEO,0:VDU29,0;0;2,1,
27,1,65,1,8,1,10
2460 FORY%=1020TO12STEP-16:VDU1,27,1,76
,1,192,1,3:FORX%=0TO1276STEP4:A%=0:B%=0:
FORZ%=0TO12STEP4:A%=A%*4+3*POINT(X%,Y%-Z
%):B%=B%*4+3*POINT(X%+2,Y%-Z%):NEXT:VDU1
,A%,1,A%,1,B%:NEXT:VDU1,10:NEXT:VDU1,27,
1,64,3
2470 ENDPROC
```

Entering the program

Kim Aldis' fractal generator listing uses line increments of 10, so use the auto line-numbering facility to save time. Disc users should note that PAGE must be set at &1300 before running the program, and that all REM statements, colon lines and unnecessary spaces should be left out if there is to be sufficient memory. Be careful to skip the number of any line you leave out, and when you have finished typing the listing in, check that the last line number you have used is the same as that in our listing. Electron users need not make any alterations to the program before running it.

Dumping fractals

You may enter your own screen dump routine in PROCuser but we have included a one line dump by George Hill, suitable for an Epson printer, as an illustration.

Listing cassettes and bar code booklet

IF KEYING in all these listings gets you down and your fingers in a tangle why not send off for our monthly listings cassette? It contains all the major programs in this issue and costs £3.75 including postage and packing. You'll find the details about the cassette and the order form on page 96.

Better still, be the envy of your friends and buy a bar-code reader (see our offer on page 113). All the listings in these yellow pages are reproduced in bar code format – send a cheque or postal order for £1.60 plus an A4-sized stamped addressed envelope to Bar Code Listings, Acorn User, 68 Long Acre, London WC2E 9JH.



See 'Projecting an image', page 139

Listing 1. Vufoil program to use with *Easyplot*

```
   10 REM Easyplot Vufoil Display
   20 REM by Martin Phillips
   30 REM for the BBC B/B+ and Electron
   40 REM (c) Acorn User October 1985
   50 :
   60 IF PAGE>&1300 GOTO 1110
   70 MODE1
   80 PROCinitialise
   90 PROCrun
  100 END
  110 :
  120 DEF PROCinitialise
  130 ON ERROR GOTO 1070
  140 E%=0:@%=0:flag=1:N%=4
  150 VDU 23;8202;0;0;0;21
  160 DIM A 2500,F 75,f(1,1)
  170 DIM Q%(75),P% 30,page$(60)
  180 f%=P%+20
  190 [OPT 0:.S%:
  200 LDX #f%MOD256:LDY #f%DIV256
  210 LDA #&D:JSR &FFF1:RTS:]:VDU6
  220 *FX 11,0
  230 REPEAT:E%=E%+1
  240 READ page$(E%)
  250 UNTIL page$(E%)="end"
  260 end=E%-1:E%=1
  270 ENDPROC
  280 :
  290 DEF PROCrun
  300 PROCload(page$(E%))
  310 IF flag=1:A$=GET$:PROCclear
  320 PROCdraw
  330 IF E%=end THEN GOTO 370
  340 E%=E%+1:PROCload(page$(E%))
  350 PROCspace
  360 GOTO 310
  370 PROCclear
  380 ENDPROC
  390 :
  400 DEF PROCload(T$)
  410 O=OPENUP(T$):INPUT#O,A%
  420 FOR N=0 TO A%:A?N=BGET#O
  430 NEXT N:CLOSE#O
  440 ENDPROC
  450 :
  460 DEF PROCdraw
  470 FOR N=0 TO 3
  480 VDU 19,N,(A?N);0;
  490 NEXT N
  500 VDU28,0,31,39,29
  510 PRINTTAB(0,2)page$(E%);
  520 N=8:REPEAT:PROCr(N)
  530 N1=FNa:PROCty(N,0,0):N=N+N1
  540 UNTILN>=A%
  550 ENDPROC
  560 :
  570 DEF PROCmo(x,y,s,e)
  580 LOCALs1:REPEAT
  590 PROCr(s)
  600 s1=FNa:PROCty(s,x,y)
  610 s=s+s1
  620 UNTILs>e-1
  630 ENDPROC
  640 :
  650 DEF PROCci(K)
  660 cs=2*PI/P%
  670 cr=SQR((Y%-y%)^2+(X%-x%)^2)
  680 ca=ATN((X%-x%)/(0.5+Y%-y%))
  690 IFY%<y% THEN ca=ca+PI:ELSE IF X%<x%
 THEN ca=ca+2*PI
  700 MOVE X%,Y%
  710 FOR cn=1 TO P%
  720 PLOT K,x%+cr*SIN(ca+cn*cs),y%+cr*CO
S(ca+cn*cs)
  730 NEXT cn
  740 ENDPROC
  750 :
  760 DEF PROCpr(pc,d):LOCAL A%,X%,Y%:VDU
5,18,pc,C%,25,4,x%;y%+32*d;:IFd=1 THEN PR
```

Continued ▶

◀ Continued

```
INTP$:VDU4:ENDPROC
  770 A%=10:X%=0:Y%=10:p=&A00:FOR pb%=1 T
O LENP$:p$=MID$(P$,pb%,1):IFp$<" ":VDU10,
8,10:pb%=pb%+1:GOTO780:ELSE?p=ASCp$:CALL&
FFF1:VDU23,240,p?1,p?1,p?2,p?2,p?3,p?3,p?
4,p?4:VDU23,241,p?5,p?5,p?6,p?6,p?7,p?7,p
?8,p?8,240,8,10,241,11;
  780 NEXT:VDU4:ENDPROC
  790 DEF PROCty(a%,ax,ay):GCOL0,C%:IFB%=
15 THEN PROCmo(ax+A!(a%+8),ay+A!(a%+12),x
%,X%):ENDPROC
  800 x%=x%+ax:y%=y%+ay:IFB%<4 THEN X%=X%
+ax:Y%=Y%+ay
  810 IFB%=1 THEN MOVEx%,y%:PLOT(D%+5),X%
,Y%
  820 IFB%=2 THEN MOVEx%,y%:PLOT(D%+5),X%
,y%:PLOT(D%+5),X%,Y%:PLOT(D%+5),x%,Y%:PLO
T(D%+5),x%,y%
  830 IFB%=3 THEN P%=D%MOD160:D%=16*(D%DI
V160):PROCci(D%+5)
  840 IFB%=4 THEN f(0,0)=A?(a%+4):f(1,0)=
A?(a%+5):f(0,1)=A?(a%+6):f(1,1)=A?(a%+7):
PROCfi
  850 IFB%=16 THEN P$=$(A+a%+8):PROCpr(0,
X%)
  860 IFB%=17 THEN MOVEx%,y%:FORi=a%+8 TO
D%+7+a% STEP3:DRAWax+256*(A?i)+A?(i+1),ay
+4*(A?(i+2)):NEXT
  870 ENDPROC
  880 DEF FNa=8+D%*(B%DIV10)
  890 DEF PROCr(a%):B%=(A?a%)DIV8:C%=(A?a
%)MOD8:x%=256*(A?(a%+1))+A?(a%+2):y%=4*(A
?(a%+3)):X%=256*(A?(a%+4))+A?(a%+5):Y%=4*
(A?(a%+6)):D%=A?(a%+7):ENDPROC
  900 DEF PROCfi:LOCALX%,Y%:f1%=1:f2%=0:P
ROCfa(x%):REPEAT:f3%=Q%(f1%):f4%=Q%(f1%+2
5):y%=4+Q%(f1%+50):f1%=(f1%+1)MOD25:PROCf
c:y%=y%-8:PROCfc:UNTILf1%=f2%+1:ENDPROC
  910 DEF PROCfc:Z%=POINT(f3%,y%):IFZ%=-1
ENDPROC:ELSEIFZ%=0f8%=f3%:ELSEPROCfb(f3%)
  920 IFf8%>f4%-N%ENDPROC
  930 REPEAT:PROCfa(f8%):PROCfb(f8%):UNTI
Lf8%>f4%:ENDPROC
  940 DEF PROCfa(x%):PLOT76,x%,y%:CALLS%:
f2%=(f2%+1)MOD25:Q%(f2%)=!f%AND&FFFF:Q%(f
2%+25)=f%!4AND&FFFF:PROCfd(Q%(f2%),Q%(f2%
+25)):Q%(f2%+50)=y%:ENDPROC
  950 DEF PROCfb(f10%):PLOT92,f10%,y%:CAL
LS%:f8%=N%+f%!4AND&FFFF:IFf8%>f4%PROCfd(f
10%,f4%)ELSEPROCfd(f10%,f8%-N%)
  960 ENDPROC
  970 DEF PROCfd(f10%,f11%):Y%=((y%+1)DIV
4)MOD2:X%=(f10%DIVN%)MOD2:IFPOINT(f11%,y%
)=0:GCOL0,f(X%,Y%):PLOT77,f11%,y%:GCOL0,f
((X%+1)MOD2,Y%):MOVEf10%+N%,y%:PLOT21,f11
%,y%
  980 ENDPROC
  990 :
 1000 DEF PROCclear:FOR N=0 TO 3:VDU19,N,
0,0,0,0:NEXT:VDU12,16,20:ENDPROC
 1010 :
 1020 DEF PROCspace:A$=GET$:CLS
 1030 IF RIGHT$(page$(E%),1)>"A" THEN fla
g=0:ELSE:PROCclear:flag=1
 1040 ENDPROC
 1050 :
 1060 DEF PROCescape:PROCclear:INPUT"GO T
O WHICH VUFOIL "A$:A%=VAL(A$):N=0:REPEAT
N=N+1:UNTIL VAL(page$(N))=A% OR N=end:E%=
N:CLS:ENDPROC
 1070 CLOSE#0:COLOUR 3:VDU4
 1080 IF ERR=222 PRINT"FILE NOT ON DISC"'
"CHANGE DISC & PRESS SPACE BAR":E%=E%-1:G
OTO 350
 1090 IF ERR=17 THEN PROCescape:GOTO300
 1100 REPORT:END
 1110 FORD%=0 TO TOP-PAGE STEP4:D%!&1300=
D%!PAGE:NEXT:?&13=?&13-(PAGE-&1300)DIV256
:PAGE=&1300:RUN
```

Continued ▶

◀ Vufoil listing continued

```
  1120 REM Enter the vufoil numbers here
  1130 DATA 1,2,3,4
  1140
  1150 REM The next line must be present
  1160 DATA end
```

Listing 2. Notice Board sequences pictures

```
   10 REM Easyplot Notice Board
   20 REM by Martin Phillips
   30 REM for the BBC B/B+ and Electron
   40 REM (c) Acorn User October 1985
   50 :
   60 IF PAGE>&1300 GOTO840
   70 MODE 1
   80 PROCinitialise
   90 REPEAT
  100 E%=1
  110 REPEAT
  120 MODE M(E%)
  130 VDU23;8202;0;0;0;
  140 PROCload(page$(E%))
  150 PROCrun
  160 I=INKEY(100*wait)
  170 E%=E%+1
  180 UNTIL E%=end
  190 UNTIL 0
  200 :
  210 DEF PROCinitialise
  220 VDU19,0,6,0,0,0
  230 VDU19,3,4,0,0,0
  240 C%=1:x%=480:y%=928
  250 P$="Easyplot"
  260 PROCpr(0,0)
  270 C%=3:x%=416:y%=780
  280 P$="Notice Board"
  290 PROCpr(0,0)
  300 INPUTTAB(4,14)"Enter time delay in
seconds "wait
  310 E%=0:@%=0:VDU21
  320 DIM A 2500,page$(30),M(30)
  330 DIM F 75,f(1,1),Q%(75)
  340 DIM P% 30:f%=P%+20
  350 [:OPTO:.S%:LDX#f%MOD256
  360 LDY#f%DIV256:LDA#&D
  370 JSR&FFF1:RTS:]:VDU6
  380 *KEY10 PAGE=&1300|M CHAIN"NOTICE"|M
  390 *FX178,0
  400 E%=0
  410 REPEAT:E%=E%+1
  420 READ M(E%),page$(E%)
  430 UNTIL page$(E%)="end"
  440 end=E%
  450 ENDPROC
  460 :
  470 DEF PROCload(T$)
  480 O=OPENUP(T$):INPUT#O,A%
  490 FOR N=0 TO A%:A?N=BGET#O
  500 NEXT N:CLOSE#O
  510 N%=2^(1+M(E%) MOD 3)
  520 n%=N%-1:IF M(E%)>3 THEN n%=(N%/2)-1
  530 ENDPROC
  540 :
  550 DEF PROCrun
  560 FOR N=0 TO n%:VDU19,N,(A?N);0;:NEXT
:N=8:REPEAT:PROCr(N):N1=FNa:PROCty(N,0,0)
:N=N+N1:UNTILN>=A%:ENDPROC
  570 DEF PROCmo(x,y,s,e):LOCALs1:REPEAT:
PROCr(s):s1=FNa:PROCty(s,x,y):s=s+s1:UNTI
Ls>e-1:ENDPROC
  580 DEF PROCci(K):cs=2*PI/P%:cr=SQR((Y%
-y%)^2+(X%-x%)^2):ca=ATN((X%-x%)/(0.5+Y%-
y%)):IFY%<y% THEN ca=ca+PI:ELSE IF X%<x%
THEN ca=ca+2*PI
  590 MOVEX%,Y%:FORcn=1 TO P%:PLOT K,x%+c
r*SIN(ca+cn*cs),y%+cr*COS(ca+cn*cs):NEXT:
```

Continued ▶

◀ Continued

```
ENDPROC
  600 DEFPROCpr(pc,d):LOCAL A%,X%,Y%:VDU5
,18,pc,C%,25,4,x%;y%+32*d;:IFd=1 THEN PRI
NTP$:VDU4:ENDPROC
  610 A%=10:X%=0:Y%=10:p=&A00:FOR pb%=1 T
O LENP$:p$=MID$(P$,pb%,1):IFp$<" ":VDU10,
8,10:pb%=pb%+1:GOTO620:ELSE?p=ASCp$:CALL&
FFF1:VDU23,240,p?1,p?1,p?2,p?2,p?3,p?3,p?
4,p?4:VDU23,241,p?5,p?5,p?6,p?6,p?7,p?7,p
?8,p?8,240,8,10,241,11;
  620 NEXT:VDU4:ENDPROC
  630 DEFPROCty(a%,ax,ay):GCOLO,C%:IFB%=1
5 THEN PROCmo(ax+A!(a%+8),ay+A!(a%+12),x%
,X%):ENDPROC
  640 x%=x%+ax:y%=y%+ay:IFB%<4 THEN X%=X%
+ax:Y%=Y%+ay
  650 IFB%=1 THEN MOVEx%,y%:PLOT(D%+5),X%
,Y%
  660 IFB%=2 THEN MOVEx%,y%:PLOT(D%+5),X%
,y%:PLOT(D%+5),X%,Y%:PLOT(D%+5),x%,Y%:PLO
T(D%+5),x%,y%
  670 IFB%=3 THEN P%=D%MOD160:D%=16*(D%DI
V160):PROCci(D%+5)
  680 IFB%=4 THEN f(0,0)=A?(a%+4):f(1,0)=
A?(a%+5):f(0,1)=A?(a%+6):f(1,1)=A?(a%+7):
PROCfi
  690 IFB%=16 THEN P$=$(A+a%+8):PROCpr(0,
X%)
  700 IFB%=17 THEN MOVEx%,y%:FORi=a%+8 TO
D%+7+a% STEP3:DRAWax+256*(A?i)+A?(i+1),ay
+4*(A?(i+2)):NEXT
  710 ENDPROC
  720 DEF FNa=8+D%*(B%DIV10)
  730 DEF PROCr(a%):B%=(A?a%)DIV8:C%=(A?a
%)MOD8:x%=256*(A?(a%+1))+A?(a%+2):y%=4*(A
?(a%+3)):X%=256*(A?(a%+4))+A?(a%+5):Y%=4*
(A?(a%+6)):D%=A?(a%+7):ENDPROC
  740 DEF PROCfi:f1%=1:f2%=0:PROCfa(x%):R
EPEAT:f3%=Q%(f1%):f4%=Q%(f1%+25):y%=4+Q%(
f1%+50):f1%=(f1%+1)MOD25:PROCfc:y%=y%-8:P
ROCfc:UNTILf1%=f2%+1:ENDPROC
  750 DEF PROCfc:Z%=POINT(f3%,y%):IFZ%=-1
ENDPROC:ELSEIFZ%=0f8%=f3%:ELSEPROCfb(f3%)
  760 IFf8%>f4%-N%:ENDPROC
  770 REPEAT:PROCfa(f8%):PROCfb(f8%):UNTI
Lf8%>f4%-N%:ENDPROC
  780 DEF PROCfa(x%):PLOT76,x%,y%:CALLS%:
f2%=(f2%+1)MOD25:Q%(f2%)=!f%AND&FFFF:Q%(f
2%+25)=f%!4 AND&FFFF:PROCfd(Q%(f2%),Q%(f2
%+25)):Q%(f2%+50)=y%:ENDPROC
  790 DEF PROCfb(f10%):PLOT92,f10%,y%:CAL
LS%:f8%=N%+f%!4 AND&FFFF:IFf8%>f4%PROCfd(
f10%,f4%)ELSEPROCfd(f10%,f8%-N%)
  800 ENDPROC
  810 DEF PROCfd(f10%,f11%):Y%=(y%DIV4)MO
D2:X%=(f10%DIVN%)MOD2:IFPOINT(f11%,y%)=0:
GCOLO,f(X%,Y%):PLOT77,f11%,y%:GCOLO,f((X%
+1)MOD2,Y%):MOVEf10%+N%,y%:PLOT21,f11%,y%
  820 ENDPROC
  830 :
  840 FOR D%=0 TO TOP-PAGE STEP4:D%!&1300
=D%!PAGE:NEXT:?&13=?&13-(PAGE-&1300)DIV25
6:PAGE=&1300:RUN
  850 REM For each picture, enter into
  860 REM DATA statements first the
  870 REM mode and then the filename.
  880 REM Separate each entry by a comma
  890 DATA 1,PROG1
  900 DATA 1,PROG2
  910 DATA 1,PROG3
  920
  930
  940
  950 REM The next line must be present
  960 DATA 1,end
```

For full details on how to use this month's programs by Martin Phillips see his article on page 139

See 'Striking a balance', page 167

Check-out our Checksums

IF you're having problems checking your listings, then send an A4 sized stamped addressed envelope plus a cheque or postal order for 50p, and we'll send you a photocopy of a line-by-line checksum value for each program in this month's *Acorn User*. These values can then be matched against your own using Tessie Revivis' BSUM program presented in the August 1985 *Acorn User*, so that you can spot instantly where the erroneous line is.

Cheques and postal orders should be made payable to Redwood Publishing and your envelope should be clearly marked Checksums and sent to Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

Checksum

The following extra lines form a checksum for the assembly language part of George Hill's Epson JX80 colour printer screen dump. Type them in and run the whole program. If an error is reported check your listing, otherwise delete the extra lines and save the program.

```
65 MODE6:LOMEM=&2800
1551 REM Checksum
1552 total%=0
1553 FOR b%=code TO P%-1
1554 total%=total%+?b%:
     NEXT
1555 IF total%<>30734
     PRINT"Checksum error
     - please check
     listing":END
     ELSEPRINT "Listing
     is OK":END
```

If a second processor is being used then you must also add the following line:

```
66 HIMEM=&6000
```

Listing 1. Epson JX80 screen dump

```
10 REM Epson JX80 screen dump
20 REM by G.B.Hill
30 REM for BBC/Electron with Plus 1
40 REM (c) Acorn User October 1985
50 :
60 REM Space for buffers and blocks
70 HIMEM=HIMEM-&500
80 code=HIMEM
90 yellow=code+&200:magenta=code+&300
:cyan=code+&400
100 DIM block 9,xstore 0,bitcode 8
110 ?xstore=0
120 logicol=block+4:physicol=block+5
130 $bitcode=CHR$27+"r"+CHR$0+CHR$27+"
*"+CHR$5+CHR$0+CHR$2
140 oswrch=&FFEE:osword=&FFF1
150 PROCassemble
160 VDU 2,1,27,1,65,1,8,1,10
170 FOR X%=0 TO 1264 STEP 16
180 FOR Y%=0 TO 1020 STEP 4
190 block!0=X%:block!2=Y%
200 CALL three_bytes
210 NEXT
220 CALL printem
230 NEXT
240 VDU 1,12,1,27,1,65,1,12,3
250 END
260 :
270 DEF PROCassemble
280 FOR pass=0 TO 3 STEP 3
290 P%=code
300 [OPT pass
310 .three_bytes
320 LDA #9
330 LDX #block MOD 256
340 LDY #block DIV 256
350 JSR osword
360 LDA #11
370 LDX #logicol MOD 256
380 LDY #logicol DIV 256
390 JSR osword
400 LDA physicol
410 EOR #7
420 STA physicol
430 LDX xstore
440 ASL yellow,X
450 ASL yellow,X
460 ASL magenta,X
470 ASL magenta,X
480 ASL cyan,X
490 ASL cyan,X
500 .y
510 LDA #4
520 BIT physicol
530 BEQ m
540 CLC
550 LDA #3
560 ADC yellow,X
570 STA yellow,X
580 .m
590 LDA #2
600 BIT physicol
610 BEQ c
620 CLC
630 LDA #3
640 ADC magenta,X
650 STA magenta,X
660 .c
670 LDA #1
680 BIT physicol
690 BEQ b
700 CLC
710 LDA #3
720 ADC cyan,X
730 STA cyan,X
740 .b
750 INC block
760 INC block
```

Continued ▶

◀ JX80 screen dump continued

```
 770 INC block
 780 INC block
 790 LDA block
 800 \ test bottom four bits
 810 AND #&F
 820 BNE three_bytes
 830 INC xstore
 840 RTS
 850 :
 860 .printem
 870 LDX #0
 880 LDA #4
 890 STA bitcode+2
 900 JSR bit_code
 910 .yloop
 920 LDA #1
 930 JSR oswrch
 940 LDA yellow,X
 950 JSR oswrch
 960 LDA #1
 970 JSR oswrch
 980 LDA yellow,X
 990 JSR oswrch
1000 INX
1010 BNE yloop
1020 LDA #1
1030 JSR oswrch
1040 LDA #13
1050 JSR oswrch
1060 LDA #1
1070 STA bitcode+2
1080 JSR bit_code
1090 .mloop
1100 LDA #1
1110 JSR oswrch
1120 LDA magenta,X
1130 JSR oswrch
1140 LDA #1
1150 JSR oswrch
1160 LDA magenta,X
1170 JSR oswrch
1180 INX
1190 BNE mloop
1200 LDA #1
1210 JSR oswrch
1220 LDA #13
1230 JSR oswrch
1240 LDA #2
1250 STA bitcode+2
1260 JSR bit_code
1270 .cloop
1280 LDA #1
1290 JSR oswrch
1300 LDA cyan,X
1310 JSR oswrch
1320 LDA #1
1330 JSR oswrch
1340 LDA cyan,X
1350 JSR oswrch
1360 INX
1370 BNE cloop
1380 LDA #1
1390 JSR oswrch
1400 LDA #10
1410 JSR oswrch
1420 RTS
1430 :
1440 .bit_code
1450 LDY #0
1460 .bloop
1470 LDA #1
1480 JSR oswrch
1490 LDA bitcode,Y
1500 JSR oswrch
1510 INY
1520 CPY #8
1530 BNE bloop
1540 RTS
1550 ]:NEXT
1560 ENDPROC
```

Listing 2. George Hill's 'mini-dump'

```
30000 DEFPROCD:DIM E% 9,Q% 960:F%=E% DIV
 256:G%=E%+4:H%=G% DIV 256:J%=E%+5:O=&FF
F1:VDU2,1,27,1,65,1,8,1,10:FORL%=1020TO0
STEP-32:FORK%=0TO1276STEP4:PROCB:NEXT:PR
OCP:VDU1,10:NEXT:VDU1,12,1,27,1,65,1,12,
3:ENDPROC
30010 DEFPROCB:N%=K% DIV 4:B%=0:C%=0:D%=
0:FORM%=0TO28STEP4:E%!0=K%:E%!2=L%-M%:A%
=9:X%=E%:Y%=F%:CALLO:A%=11:X%=G%:Y%=H%:C
ALLO:?J%=?J%EOR7:B%=1+B%*2:C%=1+C%*2:D%=
1+D%*2
30020 B%=B%+((?J%AND4)=0):C%=C%+((?J%AND
2)=0):D%=D%+((?J%AND1)=0):NEXT:Q%?N%=B%:
Q%?(N%+320)=C%:Q%?(N%+640)=D%:ENDPROC
30030 DEFPROCP:FORP%=0TO2:IFP%=0R%=4ELSE
IFP%=1R%=1ELSER%=2
30040 S%=Q%+P%*320:VDU1,27,1,114,1,R%,1,
27,1,42,1,5,1,64,1,1:FORO%=0TO319:VDU1,S
%?O%:NEXT:VDU1,13:NEXT:ENDPROC
```

Checksum

The following extra lines form a checksum for the assembly language part of George Hill's JXDUMP program. Type them in and run the whole program. If an error is reported then check your listing. Otherwise delete the extra lines and save the program.

```
  75 LOMEM=&2B00
 165 base=&900
2350 REM Checksum
2351 total%=0
2352 FOR b%=S% TO P%-1
2353 total%=total%+?b%:NEXT
2354 IF total%<>35706 PRINT
     "Checksum error - please
      check listing":END ELSE
      PRINT"Listing is OK"'"
      Remove checksum & SAVE":END
```

Listing 3. George Hill's JXDUMP program

```
  10 REM JXDUMP
  20 REM by G.B.Hill
  30 REM for BBC/Electron with Plus 1
  40 REM (c) Acorn User October 1985
  50 REM Prints all graphics modes
  60 REM using physical colour.
  70 :
  80 MODE7
  90 oswrch=&FFEE:osasci=&FFE3
 100 osword=&FFF1:osbyte=&FFF4
 110 osargs=&FFDA:oscli=&FFF7
 120 DIM user 3,cli 30
 130 name$="JX80"
 140 :
 150 PROCfiling_system
 160 IF tape THEN base=&C00
 170 IF disc THEN base=&900
 180 IF NOT (tape OR disc) THEN PRINT"C
an't *SAVE, unrecognised filing system."
:VDU7:END
 190 S%=base+3
```

Continued ▶

◀ JXDUMP continued

```
  200 block=S%
  210 Xlo=S%:Xhi=S%+1:Ylo=S%+2:Yhi=S%+3
  220 logicol=S%+4
  230 physicol=S%+5
  240 S%=S%+9:message=S%
  250 $message="Only modes 1,2,4 and 5"+
CHR$13+CHR$(7)
  260 S%=S%+24
  270 bitcode=S%
  280 $bitcode=CHR$27+"r"+CHR$0+CHR$27+"
*"+CHR$5+CHR$0+CHR$2
  290 S%=S%+8:lfcode=S%
  300 $lfcode=CHR$27+"A"+CHR$0+CHR$10
  310 S%=S%+4:ribbon=S%
  320 ribbon?0=4:ribbon?1=1
  330 ribbon?2=2:ribbon?3=0
  340 S%=S%+4:colour=S%
  350 colour?0=4:colour?1=2
  360 colour?2=1:colour?3=8
  370 S%=S%+4:xstore=S%
  380 S%=S%+1:byte=S%
  390 S%=S%+1
  400 opt=3
  410 FOR PASS=0 TO opt STEP opt
  420 P%=S%
  430 [OPT PASS
  440 .setup
  450 LDA #0
  460 STA Xlo
  470 STA Xhi
  480 STA Ylo
  490 STA Yhi
  500 LDA #2
  510 JSR oswrch
  520 LDX #8
  530 JSR setlf
  540 RTS
  550 :
  560 .reset
  570 LDX #12
  580 JSR setlf
  590 LDA #1
  600 JSR oswrch
  610 LDA #12
  620 JSR oswrch
  630 LDA #3
  640 JSR oswrch
  650 RTS
  660 :
  670 .setlf
  680 LDY #0
  690 STX lfcode+2
  700 .lfloop
  710 LDA #1
  720 JSR oswrch
  730 LDA lfcode,Y
  740 JSR oswrch
  750 INY
  760 CPY #4
  770 BNE lfloop
  780 RTS
  790 :
  800 .modecheck
  810 LDA #&87
  820 JSR osbyte
  830 TYA
  840 CMP #6
  850 BPL wrongmode
  860 CMP #3
  870 BEQ wrongmode
  880 CMP #0
  890 BNE rightmode
  900 LDA #1
  910 STA rotate+1
  920 STA byteinc+1
  930 LDA #2
  940 STA xinc+1
  950 .rightmode
  960 CLC
  970 RTS
```

Continued ▶

◀ Continued

```
  980 .wrongmode
  990 LDY #00
 1000 .msg
 1010 LDA message,Y
 1020 JSR osasci
 1030 INY
 1040 CPY #24
 1050 BNE msg
 1060 SEC
 1070 RTS
 1080 :
 1090 .one_line
 1100 LDA #9
 1110 LDX #block MOD 256
 1120 LDY #block DIV 256
 1130 JSR osword
 1140 LDA #11
 1150 LDX #logicol MOD 256
 1160 LDY #logicol DIV 256
 1170 JSR osword
 1180 LDA physicol
 1190 EOR #7
 1200 AND #7
 1210 CMP #7
 1220 BNE not_black
 1230 LDA #8
 1240 .not_black
 1250 STA physicol
 1260 .rotate
 1270 LDY #2
 1280 .rotloop
 1290 ASL byte
 1300 DEY
 1310 BNE rotloop
 1320 LDX xstore
 1330 LDA colour,X
 1340 BIT physicol
 1350 BEQ off
 1360 CLC
 1370 .byteinc
 1380 LDA #3
 1390 ADC byte
 1400 STA byte
 1410 .off
 1420 CLC
 1430 LDA Xlo
 1440 .xinc
 1450 ADC #4
 1460 STA Xlo
 1470 LDA Xhi
 1480 ADC #0
 1490 STA Xhi
 1500 LDA Xlo
 1510 AND #&F
 1520 BNE one_line
 1530 LDA #1
 1540 JSR oswrch
 1550 LDA byte
 1560 JSR oswrch
 1570 LDA #1
 1580 JSR oswrch
 1590 LDA byte
 1600 JSR oswrch
 1610 SEC
 1620 LDA Xlo
 1630 SBC #16
 1640 STA Xlo
 1650 LDA Xhi
 1660 SBC #0
 1670 STA Xhi
 1680 CLC
 1690 LDA Ylo
 1700 ADC #4
 1710 STA Ylo
 1720 LDA Yhi
 1730 ADC #0
 1740 STA Yhi
 1750 CMP #4
 1760 BEQ return
 1770 JMP one_line
```

Continued ▶

◀ JXDUMP continued

```
1780 .return
1790 LDA #0
1800 STA Ylo
1810 STA Yhi
1820 LDA #1
1830 JSR oswrch
1840 LDA #13
1850 JSR oswrch
1860 RTS
1870 :
1880 .bit_code
1890 LDY #0
1900 LDA ribbon,X
1910 STA bitcode+2
1920 .bloop
1930 LDA #1
1940 JSR oswrch
1950 LDA bitcode,Y
1960 JSR oswrch
1970 INY
1980 CPY #8
1990 BNE bloop
2000 RTS
2010 :
2020 .jx80
2030 JSR modecheck
2040 BCC start
2050 RTS
2060 .start
2070 JSR setup
2080 .mainloop
2090 LDX #0
```

Continued ▶

◀ Continued

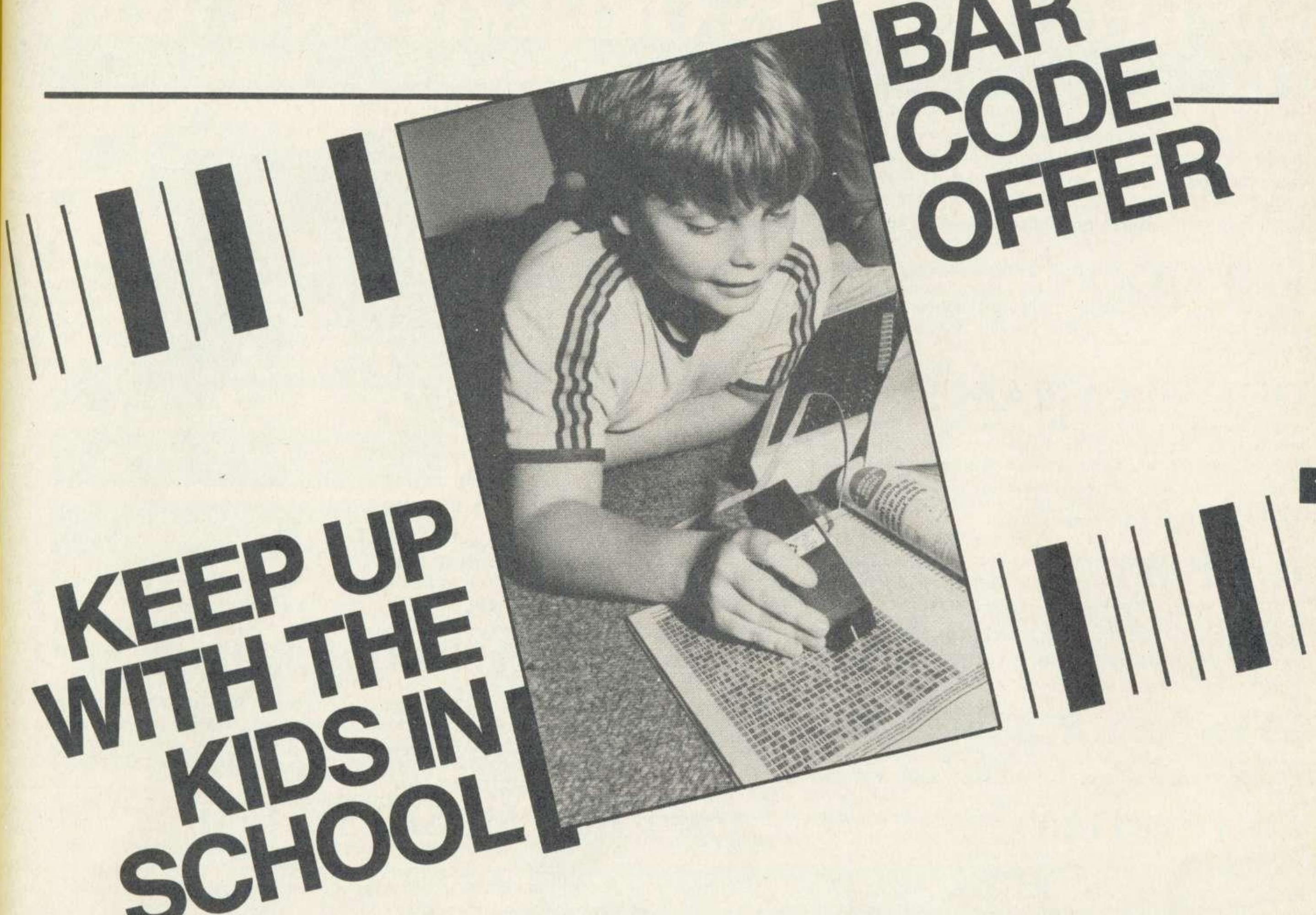
```
2100 .lineloop
2110 STX xstore
2120 JSR bit_code
2130 JSR one_line
2140 INX
2150 CPX #4
2160 BNE lineloop
2170 LDA #1
2180 JSR oswrch
2190 LDA #10
2200 JSR oswrch
2210 CLC
2220 LDA Xlo
2230 ADC #16
2240 STA Xlo
2250 LDA Xhi
2260 ADC #0
2270 STA Xhi
2280 CMP #5
2290 BNE mainloop
2300 JSR reset
2310 RTS
2320 ]:NEXT
2330 PRINT"P%=";~P%
2340 PRINT"setup=";~setup
2350 REM Insert Checksum here
2360 base?0=&4C
2370 base?1=jx80 MOD 256
2380 base?2=jx80 DIV 256
2390 :
2400 COM$="SAVE "+name$+" "+STR$~base+"
+200 "+STR$~base
2410 PROCoscli(COM$)
2420 PRINT'"SAVING DUMP"''"*";COM$
2430 END
2440 :
2450 DEFPROCfiling_system
2460 X%=&80:Y%=0:A%=0
2470 !user=USRosargs
2480 tape=(?user=1 OR ?user=2)
2490 disc=(?user=4)
2500 ENDPROC
2510 :
2520 DEFPROCoscli($cli)
2530 X%=cli MOD 256:Y%=cli DIV 256
2540 CALLoscli
2550 ENDPROC
```

Important Memory Locations

Address	Use
base	space reserved for jump instruction
block	four bytes containing x and y co-ordinates
logicol	logical colour of point
physicol	physical colour of point
message	"wrong mode" message
bitcode	code for colour and bit image control
lfcode	code for linefeed control
ribbon	four one-byte stores containing code to control yellow/magenta/cyan ribbon
colour	four bytes containing the logical value for yellow/magenta/cyan
xstore	temporary store for X register
byte	printer byte under preparation

Machine-code Subroutines

Name	Function
setup	sets X & Y to top left & sets lf to 8
reset	resets linefeed to 12 & sends formfeed
setlf	sets linefeed according to X register
modecheck	checks display mode. If not graphics then error message issued and carry set
one_line	gets one line of yellow/magenta/cyan data & prints it
bit_code	sends ESC r ?? ESC * 5 0 2
jx80	main dump program



BAR CODES will revolutionise the way we use computers in applications as well as the way we load data. Here is the chance to get experience of this important development by ordering the Addison Wesley/MEP Bar Code Teaching Pack (see our January issue, page 129) direct through *Acorn User*.

These BBC micro bar code readers are being offered to schools first and versions will not be available to the public in the shops until later in the year – when they will certainly cost more. However, because of its active involvement in the scheme *Acorn User* is able to offer the Teaching Packs direct to readers at the introductory price of £49.95 plus £2.95 post and packing (plus VAT).

Acorn User will be printing some listings in bar code format in each issue and making booklets of bar codes available by mail order.

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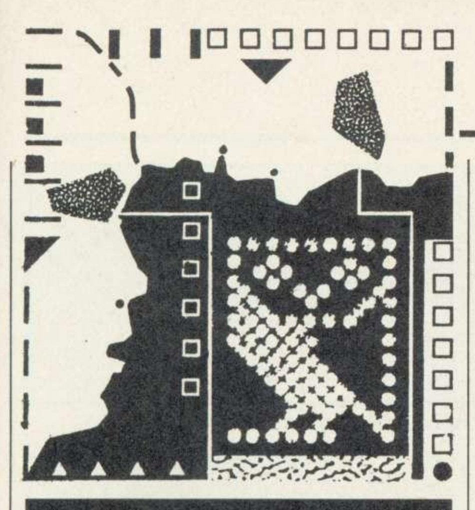
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Bruce Smith is in the chair with tips on the Graphics Extension ROM, a mode 7 function keystrip and one for *Disc Doctor* users

Get your graphics priorities right

READERS who have purchased Acornsoft's excellent new Graphics Extension ROM (GXR) might like to know of a few incompatibility problems.

Early versions of the Raven-20 software do not claim the OSWRCH vector correctly, neither does the Computer Concepts Graphics ROM. However, both can be used with the GXR providing they are placed in lower priority sockets.

Several ROMs make illegal use of *FX163. The GXR uses *FX163,242 with the third parameter in the range 0–66. *FX163s with second parameters greater than 191 are allocated to Acornsoft ROMs. Unfortunately some ROMs, for example *Wordwise Plus*, use *FX163 with *any* parameters which is a 'waste' of a whole OSBYTE and prevents ISO Pascal, Logo and the GXR from working unless they are in higher priority sockets.

Finally, any program which uses the workspace below the default value of PAGE may run into trouble if it corrupts the GXR private workspace. However, the GXR can be switched off with *NOGXR, so preventing this.

£10 Doctors orders

MICHAEL Stevens from Leicester has supplied a one-line function key definition that allows owners of *Disc Doctor* to find Basic keyword tokens. Michael writes . . .

One utility provided by *Disc Doctor* is a FIND command. This locates a string of characters within a Basic program.

However, it's not as useful as it might be, because it will not allow you to search directly for Basic reserved words, eg, PRINT, GOTO, etc. This is because Basic tokenises each of its key words into a unique one-byte value. Thus when *FIND PRINT is entered (to search for all print statements), *Disc Doctor* looks for the characters P-R-I-N-T instead of the appropriate token (241).

My program, which is held as a function key definition, shifts the emphasis in the FIND routine so that if a keyword is entered to be searched for, the token is looked for instead of the actual text. Non-Basic keywords are searched for in the normal way. Remember the program will only work if you have the *Disc Doctor* chip in your micro.

To use the utility, type in the function key definition *exactly* as shown. Do not add extra spaces or miss anything out.

Pressing the function key then prints : five times as an input prompt. In response, enter the word which is to be searched for and press Return. The numbers of any lines on which the word was found will be printed out in the normal *Disc Doctor* way.

The system works like this. It allows Basic to have a go at tokenising the word entered in the keyboard buffer. If it could be tokenised *Disc Doctor* is asked to look for the appropriate token; if it couldn't, the entire word is searched for.

```
*KEY 0 |!o21|K|MX%=47:Y%=7:$&72F="FI. "+$&72B:CALL&FFF7:DEF|F:::::
```

Function key definition to find Basic keyword tokens, for use with *Disc Doctor*

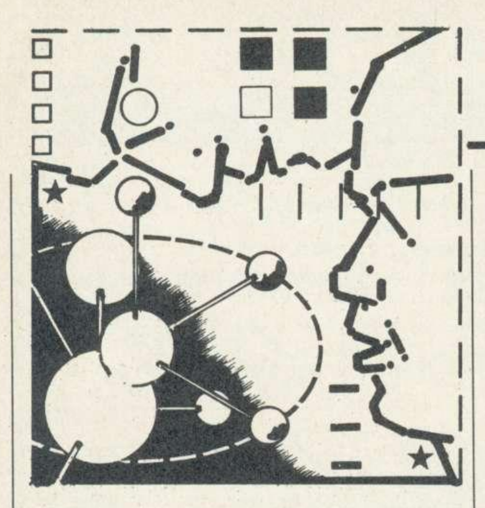
£5 A new mode in function keystrips

MANY of you were pleased with Dr Osborne's dynamic keystrip in the June issue. Alec Whitfield from Maidenhead was and has reworked the program for use in mode 7.

As Alec mentioned in his letter there are some limitations but I think it's still of great practical use.

```
   10 REM MODE 7 Dynamic F-key Strip
   20 REM for BBC B/B+
   30 REM by Alec Whitfield
   40 REM (c) Acorn User October 1985
   50 :
   60 MODE7
   70 DIM f$(2,2,9)
   80 REM (legend,level,key)
   90 f$(0,0,0)="TO":f$(0,0,1)="BE"
  100 f$(0,0,2)="OR":f$(0,0,9)="XYZ"
  110 f$(0,1,0)="ABC":f$(0,1,3)="NOT"
  120 f$(0,1,4)="TO":f$(0,1,5)="BE"
  130 f$(0,2,6)="THT":f$(0,2,7)="IS"
  140 f$(0,2,8)="THE":f$(0,2,9)="QU"
  150 f$(1,0,1)="ONE":f$(1,1,1)="NOK"
  160 f$(1,2,1)="THE":f$(1,0,2)="TWO"
  170 f$(1,1,2)="AT":f$(1,2,2)="DOR"
  180 INPUT "Number of levels ",level
s
  190 IF levels<1 OR levels>3 THEN 18
0
  200 levels=levels-1
  210 :
  220 REPEAT
  230 CLS
  240 INPUT "Which legend (1-3) ",leg
end
  250 IF legend<1 OR legend>3 THEN 24
0
  260 legend=legend-1
  270 PROCkeylegend
  280 UNTIL FALSE
  290 :
  300 DEF PROCkeylegend
  310 VDU 28,0,24,39,21-levels
  320 PROCdrawframe
  330 f$(legend,levels,9)=LEFT$(f$(le
gend,levels,9),2)
  340 FOR F%=0 TO levels
  350 FOR E%=0 TO 9
  360 PRINT TAB(1+4*E%,3+F%) f$(legen
d,F%,E%);
  370 NEXT:NEXT
  380 VDU 28,0,20-levels,39,0
  390 ENDPROC
  400 :
  410 DEF PROCdrawframe
  420 VDU 151,44,44,44
  430 FOR E%=1 TO 9
  440 VDU 60,44,44,44:NEXT
  450 :
  460 VDU32,32,48,151
  470 FOR E%=1 TO 9
  480 VDU 53,135,48+E%,151:NEXT
  490 :
  500 VDU 151,44,44,44
  510 FOR E%=1 TO 9
  520 VDU 61,44,44,44:NEXT
  530 :
  540 FOR F%=0 TO levels
  550 VDU 151,32,32,32
  560 FOR E%=1 TO 9
  570 VDU 53,32,32
  580 IF NOT (E%=9 AND F%=levels) THE
N VDU 32
  590 NEXT:NEXT
  600 :
  610 ENDPROC
```

Beeb Forum is a platform for ideas, tips and applications relating to the BBC micro and the Electron, intended for experienced programmers to share their thoughts. For every reader's tip published we pay £5 – or more for something special. Contributions should be typed or printed, with substantial listings on cassette. WRITE TO Beeb Forum, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.



More tricks from Mike Barwise

£5 State monitor development

THOMAS Harris, an A-level science student at Redditch College, has sent in a design for a state monitor (figure 1). Good try, Thomas, although the idea can be taken further without difficulty.

Thomas' monitor is effectively a buffered set of LEDs. These will light when the output of the NAND gates go LOW, and go out when the outputs go HIGH. I think that the current limiting resistor is rather a high value, due to the 8mA maximum current available from the 74LS00, so the LEDs will be quite dim.

A better solution would be to use one of the 'artillery' open collector NAND gates like 7438, which can deliver currents in the region of 48mA. A smaller resistor (generally in the region of 300R-470R) could then be used to allow the full LED current of approximately 12mA to pass. The inputs will of course apply one standard TTL load (approximately three LS loads) to the lines under test.

There is one major drawback to this type of state monitor – unless you can single-step your system, all you will see is a row of blinking LEDs. This limits the usefulness of the passive design to the detection of 'something happening or not' unless you can single step the system under test. We can, however, go further without much problem.

If we replace the NAND gates (used as buffers) with latches, we can trap an event running at full speed, and hold the result for as long as we want. The chosen part is the 74LS373 transparent octal latch. These have high current (24mA) buffered outputs, and while the ENABLE is held HIGH, act as buffers. When the ENABLE is taken LOW, the states of the inputs are latched and held until ENABLE goes HIGH again. It follows that, if we can provide a means of controlling the latch ENABLE from the circuit under test, a single event can be trapped and examined while the system is running at full speed. The 74LS373 is guaranteed up to 35MHz, so the Atom user should have no timing problems!

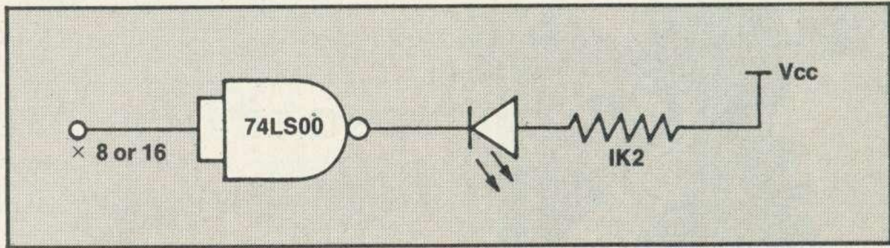


Figure 1: Thomas Harris' design for a state monitor – effectively a buffered set of LEDs

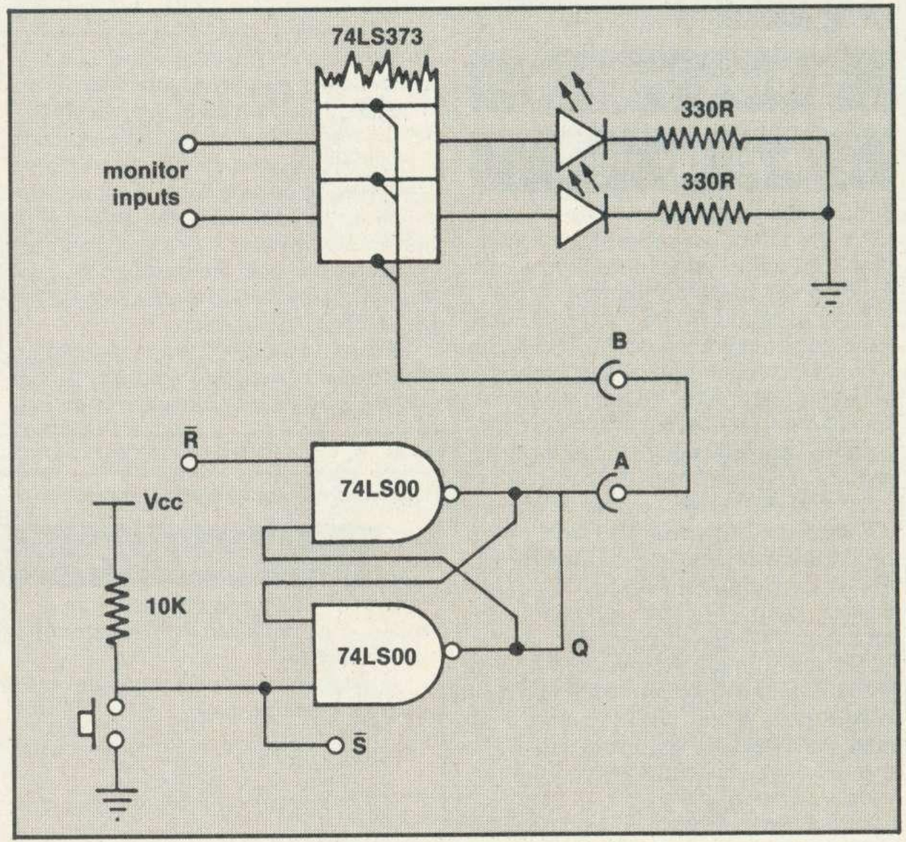


Figure 2: Demonstrates the general principle of the state monitor

Figure 2 shows the principle of the state monitor. An SR flip flop is set by, for example, pushing a button, and its Q (non-inverting) output passed to the latch ENABLEs. The states of the latches are thereafter passed to the LEDs until the RESET of the SR flip flop is driven by some selected trigger signal. The flip flop then resets, taking the latch ENABLE LOW and trapping the data presented to the latches within the total decode and latch propagation time. This will depend on the circuit of the decode to the trigger driving the SR RESET, but 100nS should not be difficult to achieve, allowing event trapping up to 10MHz.

Useful enhancements to the trigger circuit include the provision of a decode from up to 24 lines (figure 3), and optional short pulse monostable to allow signals with a relatively long stable period (eg, address lines) to trap themselves and a one-and-only-one circuit to allow selection of trigger event (figures 4 and 5).

The decode in figure 3 is set up by applying a test word to each of the chips' Q inputs. They have internal pullup resistors. The P inputs are connected to the lines under test. Any 'don't care' line Q is directly coupled to its associated P input. When Q and P match, a LOW output results.

The simplest configuration of the state monitor is to use one figure 3 and one figure 2, connecting figure 3 F to figure 2 R and linking figure 2 A to B. The LED display will then be frozen when the P and Q words match. If you wish to find out whether the signals under test are stable, the monitor

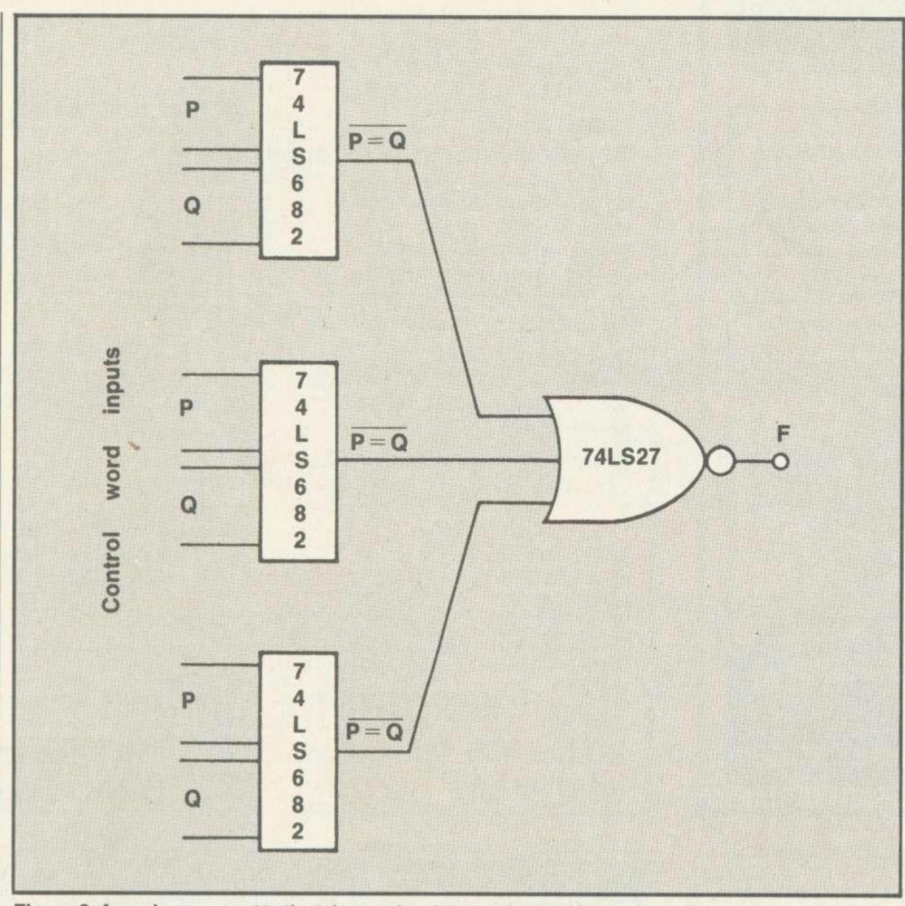


Figure 3: An enhancement to the trigger circuit is the provision of a decode from up to 24 lines

inputs may be paralleled to the P inputs and figure 4 may be connected into the circuit (C to A and K to B) to delay the latching of the word until some time after the output from figure 3 F. The delay is set by the monostable timing components, so if you include a switched resistor network, a range of preset delays may be introduced. If the monitor LEDs do not show the same word as you set up on the decode, the signals are obviously not stable for the duration of the delay you have set.

An enhancement allowing advanced dynamic testing is the use of figure 5. This is the one-and-only-one circuit. It guarantees that J is only switched after one pulse at G followed by one pulse at H.

Therefore, if one of figure 3 is connected to each of figure 5 G and H, and figure 5 J is connected to figure 2 R, the LED display will be frozen only when a word match decoded to H follows a word match decoded to G. This can be a pretty exclusive condition if you select the lines driving the compared words very carefully.

It is beyond the space I have here, but if you consider adding, for example, a counter in the system between figure 5 J and figure 2 R, the result of our example becomes 'when word to H follows word to G for the Nth time' where N is a preset count. At this level, it is already possible to identify software routines in execution.

Obviously, the more complex state monitor will demand a greater understanding of system timings and of what you are looking for. It will, however, yield much more useful information, and may even be used to analyse software as it runs.

Useful trigger signals are: PHASE 2, R/W, NRDS, NWDS, SYNC (indicates OP code fetches) and of course the address and data bus lines.

It's important to remember that the Atom's 6502 uses the data bus for all instruction and operand fetches, and that certain instructions perform fetches of irrelevant data due to the 6502 pipeline architecture. Therefore control lines (R/W, SYNC, etc) must normally be included in the trigger event decode to avoid ambiguity when the data lines are initiating the trigger.

The simplest construction approach would probably be a patchboard with wire jumpers to set up the monitor for a given task, and lots of those cunning little IC size spring hooks.

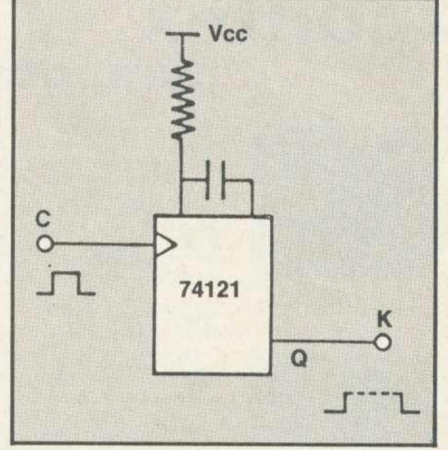


Figure 4: An optional short pulse monostable

I will be writing further on this and similar systems hardware topics in forthcoming issues, and would like lots of submissions of hardware concepts and ideas. Don't worry if you think yours is a bit elementary, it's all valuable. If your idea asks a question it's as good as if it provides an answer. Please note, though, that we don't normally have room for 'how to wire it up' submissions, eg, how to piggyback RAM. These have been well covered in past issues and in this, the Atom's fifth year, I would like to help expand the understanding of its hardware concepts, rather than just bore you with advice on not plugging in ROMs upside down.

Figure 5: A one-and-only-one circuit to allow selection of trigger event

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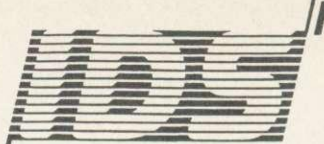
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Polymedia enters the video market

THE latest entrant in the burgeoning market of BBC micro-based interactive video systems is Polymedia.

The PCL 1000 costs £2450 and comprises BBC micro, single disc drive, colour monitor, software, interface electronics and a small Sony Betamax video tape recorder.

The interface will also be available separately at about £250 for Beeb owners who want to make up their own system, but domestic video recorders need to be modified internally.

Further details from Polymedia, Polytechnic of Central London, 18-22 Riding House Street, London W1P 7PD.



Quay launch CBT packs

A RANGE of computer-based training (CBT) software for the commercial market is available from Quay Software.

Computer Literacy shows how computers are used in a commercial environment. Teachers' notes are included, and the price is £395 or £150 for the educational version.

Problem-Solving Meetings at £600 is designed to help managers accomplish more in meetings. *Effective Writing* and *Presentation Techniques* cost £200 each.

Hands On comes somewhat cheaper at £10, and is a simple introduction to finding your way around a BBC micro.

Further details from Quay Software on (0590) 79244/5.

The key to comfort

FRUSTRATED businessmen who've failed to master the qwerty keyboard could benefit from the Maltron ergonomic keyboard for the BBC micro.

It costs £201.25 and is claimed to offer improved operator comfort and accuracy by allowing the hands to rest in a more natural position, and to be easier to learn than the conventional layout.

All the Beeb's keys, including the function and cursor keys are available. The existing BBC micro keyboard has to be modified, either by the makers or someone competent at soldering.

Details from PCD Maltron, 15 Orchard Lane, East Molesey, Surrey KT8 0BN.



Z80 bundle is upgraded

ACORN is to upgrade the bundled software supplied with the Z80 second processor, but has no plans to release any new business software for the machine.

A package of update discs will be available in the autumn for the 10 CP/M applications programs included in the Z80 package, including fixes to known bugs and some enhanced features. The MemoPlan Configuration program, in particular, has been improved.

Now the bad news. Existing Z80 owners – some 10,000 to date – will have to pay extra for the new discs. The price has yet to be fixed.

David Bell, who heads the Acorn Z80 project, said, 'We have a policy of continuous improvement. It's similar to when a car manufacturer improves a particular model; owners of the old model can upgrade if they want but they have to pay for the new extras.'

When it comes to expanding the software base for the Z80, Acorn seem content to rest on its laurels. There are no plans to develop any new software for the Z80 or even distribute any of the popular third party titles such as *dBase II, Friday* and *Wordstar*.

Bell said, 'We've provided the hardware, it's up to software companies to supply the software.'

●Technomatic and the CP/M User Group (CP/M (UK), c/o Diana Fordred, 72 Mill Road, Hawley, Dartford, Kent) will convert CP/M programs to run on the Acorn Z80 second processor.

Elk's business duo

ELECTRON users can now buy business software in ROM form from Slogger. Two programs are available – the *Starword* wordprocessor and *Starstore*, a database program.

Starword features 40 or 80 column screens, search and replace, cut and paste, and supports all printer types.

Starstore allows names and addresses to be sorted and extracted from the database to create a mailing list file, which can then be merged into *Starword*-created text files.

Further details from Slogger Software, 215 Beacon Road, Chatham, Kent ME5 7BU.

It's a fair Kopper

AN integrated business software suite for the BBC micro is being marketed by Kopper at £35.

The *Kopper System* comes on a ROM chip and two discs, and offers wordprocessing, filing, bank reconciliation and VAT programs. It also has a diary and calculator feature, and the suite is password-controlled.

Details from Kopper, 25 Pilgrims Lane, London NW3 1SX.

TOP 10 BUSINESS/UTILITY CHART

Title	Publisher	Cassette	Disc	ROM	Electron	Shadow on B+	6502	Econet
1 Mini Office	Database	£5.95	£7.95 £9.95+	—	£5.95	*	*	—
2 View	Acornsoft	—	—	£59.80	—	—	—	—
3 Wordwise Plus	Computer Concepts	—	—	£56.35	— —	— —	Yes £4.95	—
4 Database	Acornsoft	£11.90	£15.35	—	—	—	—	—
5 Wordwise	Computer Concepts	—	—	£56.35	—	—	—	—
6 ViewSheet	Acornsoft	—	—	£59.50	—	—	—	—
7 Masterfile 2	Beebugsoft	—	£19.00	—	—	Yes	Yes	—
8 Printmaster	Computer Concepts	—	—	£33.35	—	*	Yes*	—
9 Accounts (series)	Acornsoft	—	£24.95	—	—	—	—	—
10 Discmaster	Beebugsoft	—	£19.00	—	—	Yes	Yes	—

Compiled by RAM/Computer from a panel of specialist dealers

*Contact publisher: Database, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY 061-480 0171; Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX (0442) 63933; Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD (0223) 214411; Beebugsoft, PO Box 50, St Albans, Herts.

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S80S	single drive (400k) 40/80 switchable double sided	**£120** (b)
S80FD	single drive (400k) full height 80 track double sided	**£100** (b)
S80F	single drive (200k) full height 80 track single sided	**£80** (b)
S40S	single drive (100k) 40 track single sided	**£100** (b)
D35	dual 3½" drives (2 × 400k) 80 track double sided	**£200** (b)
S35	single 3½" drive (400k) 80 track double sided	**£115** (b)

ACORN INTERFACE **£55** (c)
ACORN DNFS **£75** (c)
8271 **£46** (a) **27128** **£5** (a)
2764 **£2.75** (a) **6264LP** **£5** (a)

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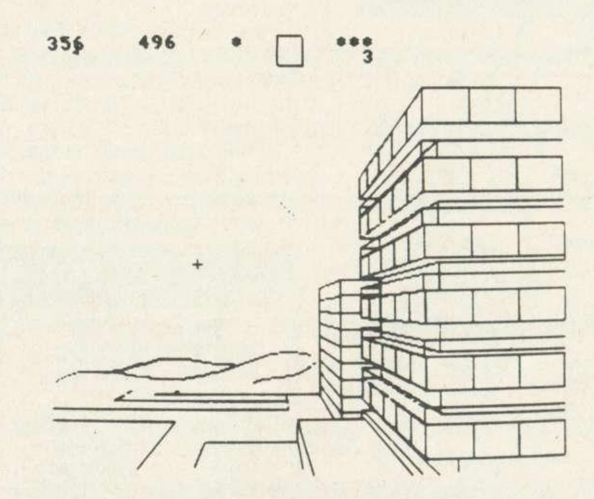
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GET MORE FROM MEMOPLAN

Make full use of this package with Edward Brown

WE FIRST visited the *MemoPlan* package in May and examined how the programs that make up the package could be used. In addition patches were supplied to make some of the programs more useful. Since then I've been inundated with letters requesting further information and advice in making the best use of *MemoPlan*.

This time we'll look at how to format the page, how to improve the display by adding more lines and colours, how to speed up *MemoPlan*, how to use different printers – and other useful techniques.

For some of the items it will be necessary to have installed the patches for CONFIG.COM given in the May issue. When you apply these patches please note that some of the user inputs were not shaded as specified in the text. In figures 6 and 7 of the May article the third column following the Snnnn should also be shaded.

Formatting the page

The *MemoPlan* print program MEMOP outputs a standard page of 55 lines in single-line spacing with margins at the top, bottom, right and left of the page.

There are four lines allowed for the

Half-inch	=	1,270 micas
Inch	=	2,540 micas
1/2540 inches	=	1 mica
1/30,480 feet	=	1 mica

Common paper sizes

$8\frac{1}{2}$ inches	=	21,590 micas
11 inches	=	27,940 micas
$14\frac{3}{4}$ inches	=	37,465 micas

Working on the basis of 10 characters per inch and 6 lines per inch the following apply:

1 character	=	254 micas
1 line	=	423 micas
80 characters	=	20,320 micas
6 lines	=	2,540 micas
132 characters	=	33,528 micas
66 lines	=	27,918 micas
24 lines	=	10,160 micas

Table 1. Mica equivalents

In the following description the numbers referred to are those given when examining CONFIG.DAT under DDT. These are shown in the screen parameters panel.

Locations	Description
A00H-A0FH	Device name, up to 16 characters terminated by 0H. The current value is bbc.
A10H	The number of lines on the screen.
A11H	The number of columns on the screen.
A12H-A13H	Offset for screen positioning.
A14H	Number of attributes.
A15H	Pointer to terminal initialisation string.
A16H	Pointer to terminal de-initialisation string.
A17H	Pointer to string to home and clear to end of screen.
A18H	Pointer to string to clear to end of screen.
A19H	Pointer to string to clear to end of line.
A1AH	Pointer to string to perform cursor positioning.
A1BH	Pointer to string to ring the bell.
A1CH	Pointer to string to set screen attributes.
A1DH	Pointer to string to insert a number of lines.
A1EH	Pointer to string to delete a number of lines.
A1FH	Pointer to string to scroll a region of the screen.
A20H-A7FH	The actual strings that are sent.

For the version of CONFIG.DAT supplied with the Z80 second processor the following apply:

Location	Points to	Which gives
A10H		24 lines
A11H		79 columns
A12H-A13H		No offset
A14H		One attribute
A15H	A20H	Select mode 3
A16H		Not implemented
A17H	A23H	Clear text area
A18H		Not implemented
A19H		Not implemented
A1AH	A25H	Position to X, Y, *(see note)*
A1BH	A31H	Ring bell (CTRL G)
A1CH-A1FH		Not implemented

For the new version of CONFIG.DAT the following apply:

Location	Points to	Which gives
A10H		32 lines
A11H		79 columns
A12H-A13H		No offset
A14H		Two attributes
A15H	A20H	Select mode 1 and colours required
A16H	A3BH	Clear screen on exit
A17H	A40H	Clear text area
A18H		Not implemented
A19H		Not implemented
A1AH	A42H	Position to X, Y *(see note)*
A1BH	A4EH	Ring bell (CTRL G)
A1CH	A50H	Select different attributes for messages *(see note)*
A1DH-A1FH		Not implemented

NOTE: *The specification of certain fields involves the use of an internal logic notation which is beyond the scope of this article.*

Table 2. Layout of the BBC section in CONFIG.DAT

top of page, four for a header, four between header and text, 35 lines for text, four between text and footnote, and four for the bottom margin. There are 50 characters across the page with six allowed for left and right margins, leaving 38 characters for text.

MEMOP assumes that you require space at the top and bottom of your page for headings and footnotes and space at the side of your page for margins. This is not always the most convenient layout for your output, but you can alter this layout by using the margin options when calling MEMOP and by using a version of CONFIG that has been modified with the patches shown in the May issue.

MEMOP assumes that left and right margins are required and these are set to half an inch – equivalent to four normal characters or five condensed characters on most printers. It is possible to overwrite these defaults using the -NM, -R and -L options on the command line of MEMOP. The -NM option will remove all margins from the printout and put the print to the leftmost print position of the printer. The -R and -L options are indents from the leftmost print position of the printer; for example, if a margin of 20 characters is required from the left edge of the paper then MEMOP would be called with -L20. Another method of setting the margin to the leftmost print position is to use -L with a negative offset. The same principle of using a negative offset applies to the right margin and we can use this to enable output of 132 columns by using -R -47. It must be remembered, however, that a page-width of 132 characters would have to be used in MEMO to generate a document suitable for printing once the 132 column


```
; INITP PRINTER SETTING PROGRAM
; WRITTEN BY M.J.COZENS AND MODIFIED BY E.J.BROWN
; FOR BBC MODEL B WITH Z80 SECOND PROCESSOR
; (C) E.J.BROWN
;
; THIS PROGRAM RESETS THE HASH AND POUND KEYS TO THE BRITISH FONT
; AND GIVES A CHOICE OF FORMAT FOR THE PRINT OUT.
;
; ALL TEXT FROM THE ; ONWARDS MAY BE OMITTED ON INPUT.
;
; DEFINE THE CONSTANTS FOR THE PROGRAM
;
CLS      EQU     0CH      ;CLEAR SCREEN
CR       EQU     0DH      ;CARRIAGE RETURN
ESC      EQU     1BH      ;ESCAPE
LF       EQU     0AH      ;LINE FEED
SHIFT    EQU     5FH      ;CHANGE FROM LOWER TO UPPER CASE
;
; DEFINE OUTPUT VECTORS
;
CPM      EQU     5        ;BDOS CALL VECTOR
OSWRCH   EQU     0FFEEH   ;MOS WRITE CHARACTER VECTOR
;
; DEFINE BDOS CALL PARAMETERS
;
CONIN    EQU     01H      ;INPUT CHARACTER FROM CONSOLE
LIST     EQU     05H      ;OUTPUT CHARACTER TO PRINTER
CONOUT   EQU     09H      ;OUTPUT STRING TO CONSOLE
;
; SET THE START OF THE PROGRAM TO THE DEFAULT LOAD ADDRESS
;
         ORG     100H
;
START:   LXI     H,KEYS   ;LOAD ADDRESS OF STRING "KEYS"
         CALL    PRINT    ;AND SEND TO PRINTER & SCREEN VIA BBC B
         LXI     H,INIT   ;DITTO FOR STRING "INIT"
         CALL    PRINT    ;
MODE:    MVI     C,CONIN  ;LOAD C WITH 01 FOR CPM CONSOLE INPUT ROUTINE
         CALL    CPM      ;CALL CPM
         CPI     CR       ;CHECK FOR CARRIAGE RTN <CR>, IF SO
         RZ               ;RETURN TO THE CCP WITHOUT A WARM BOOT
;
         ANI     SHIFT    ;CONVERT LOWER CASE LETTER TO UPPER
         CPI     'C'      ;CHECK FOR C,S,E,S,D,M,L,R IN TURN
         CZ      COND     ;AND GO TO SUBROUTINE FOR THAT LETTER
         CPI     'E'      ;
         CZ      ENLA     ;
         CPI     'S'      ;
         CZ      SCRI     ;
         CPI     'D'      ;
         CZ      DOUB     ;
         CPI     'M'      ;
         CZ      EMPH     ;
         CPI     'L'      ;

         CZ      DLSP     ;
         CPI     'R'      ;
         CZ      RSET     ;
         MVI     A,CR     ;LOAD A WITH CR TO OVER WRITE ILLEGAL LETTERS
         CALL    OSWRCH   ;CALL OS DIRECT TO SEND CR TO SCREEN
         JMP     MODE     ;LOOP BACK TO MODE FOR ANOTHER INPUT
;
; DEFINE THE STRING FOR ALTERING THE PRINTER CHARACTER SET
;
KEYS:    DB      ESC,64,'$',CLS,23,96,48,24,12,0,0,0,0,0,23,35,28,54,48,124,48,48,
126,0,'$'
;
; DEFINE THE PRINTER AND CONSOLE MESSAGES
; STRINGS CONSIST OF THE SEQUENCE ESCAPE, COMMAND EG. ESC,64;
;
INIT:    DB      ESC,64,'$',CR,LF,'Printer Setting',CR,LF,LF
         DB      'C Condensed       ','E Enlarged       '
         DB      'S Superscript     ',CR,LF,LF,'D Double Print    '
         DB      'M Emphasize       ',CR,LF,LF,'L Line Space 1/3"  '
         DB      'R Reset printer   ','<RTN> to CPM',CR,LF,LF,'$'
MSGC:    DB      15,'$',' Condensed no M',CR,LF,'$'
MSGE:    DB      ESC,87,1,'$',' Enlarged no S',CR,LF,'$'
MSGS:    DB      ESC,83,0,'$',' Superscript no E D or M',CR,LF,'$'
MSGD:    DB      ESC,71,'$',' Double Print no S',CR,LF,'$'
MSGM:    DB      ESC,69,'$',' Emphasize no C or S',CR,LF,'$'
MSGL:    DB      ESC,65,24,'$',' Line Space 1/3"',CR,LF,'$'
MSGR:    DB      ESC,64,'$',' Reset Printer',CR,LF,'$'
;
; SUBROUTINES FOR THE PROGRAM
;
PRINT:   MOV     A,M      ;GET THE NEXT CHARACTER
         CPI     '$'      ;SEE IF END OF PRINTER STRING
         JZ      PRINTED  ;IF NOT GO AND PRINT NEXT CHARACTER
         MOV     E,A      ;GET CHARACTER TO BE PRINTED IN REGISTER E
         MVI     C,LIST   ;LOAD C WITH CPM  STRING FUNCTION
         PUSH    H        ;SAVE THE STRING POINTER FROM CORRUPTION
         CALL    CPM      ;CALL CPM - COMMON PRINT SUB ROUTINE
         POP     H        ;NOW RESTORE THE STRING POINTER
         INX     H        ;INCREMENT THE STRING POINTER
         JMP     PRINT
PRINTED:
         XCHG             ;EXCHANGE DE AND HL
         INX     D        ;POINT TO START OF CONSOLE STRING
         MVI     C,CONOUT ;LOAD C WITH CONSOLE OUT FUNCTION
         CALL    CPM
         RET
;
COND:    LXI     H,MSGC   ;FIND MESSAGE FOR CONDENSE AND
         CALL    PRINT    ;PRINT
         RET
;
ENLA:    LXI     H,MSGE   ;DITTO FOR ENLARGE
         CALL    PRINT
         RET
;
SCRI:    LXI     H,MSGS   ;DITTO FOR SUPERSCRIPT
         CALL    PRINT
         RET
;
DOUB:    LXI     H,MSGD   ;DITTO FOR DOUBLE
         CALL    PRINT
         RET
;
EMPH:    LXI     H,MSGM   ;DITTO FOR EMPHASIZE
         CALL    PRINT
         RET
;
DLSP:    LXI     H,MSGL   ;DITTO FOR 1/3" LINE SPACE
         CALL    PRINT
         RET
;
RSET:    LXI     H,MSGR   ;DITTO FOR RESET IN CASE YOU
         CALL    PRINT    ;GOT THE WRONG COMBINATION
         RET
         END
```

Listing 1. INITP printer initialisation program

mode is selected.

Using a modified CONFIG program, the left and right margin defaults can be modified along with the margins at the top and bottom of the page. Select options 5 to 10 in the default parameters menu of CONFIG.

Options 5 and 6 are the amount of space to skip at the top and bottom of the page. Options 7 and 8 are the amount of space to indent the left and right margins. Option 9 is the amount of space to leave between the heading and the start of the text, and option 10 is the amount of space to leave between the text and any footnote (the version of *MemoPlan* supplied by Acorn does not allow the entry of footnotes, though).

All the measurements are supplied in micas, a mica being the smallest measurement in printing – 1270 micas equal approximately half an inch. Table 1 provides a summary of equivalent measurements. By altering these settings it is possible to set the margins and lines per page to your own requirements. For example, by setting options 5, 6, 9 and 10 to 0 it is possible to get 74 lines of print onto a sheet of sprocket-fed A4 paper.

Hints on printing

If you want to print only a selection of pages from your document call MEMOP using the -PAGE n option to start from page n and print to the end of the document. If you want to stop before the end of the document stop the print using CTRL C, CTRL Z or CTRL G, depending on what you wish to do with any other print files you may be outputting. Alternatively you can embed a CTRL Z in the document by using the Quote (CTRL f1) key followed by a CTRL Z and the printout will end at this point, enabling you to select the pages you wish to output.

Double line-spacing can be achieved on most printers by setting dip switches. If this is not convenient the following may be useful.

First, save the text file with a standard extension (I use TXT). Next, use the Replace (Shift f7) key and replace every Return with two Returns. In replace mode the Return key will give a display of <NL> on the prompt line. Now save the file with a different standard extension (I use PRT), exit MEMO and use MEMOP to print the file.

Once the file is printed delete the file with the PRT extension as it will take up space on the disc. If you want to edit the document again return to MEMO and read in the original file with the TXT extension.

When using MEMO to print you are limited to the number of command line parameters you can enter. To avoid this restriction it is best to save the file, exit from MEMO and then use the print program MEMOP directly. Remember that when using the -TITLE option the number of characters is restricted by the width of the printout you have asked for. If you don't have enough room for your heading use -R with a negative option to get more character positions.

If you want to use a different character set for the whole of a document when printing then you should initialise your printer by using a program such as the public-domain PINIT or the program INITP (listing 1) on page 123. INITP is a modified version of a program supplied by M J Cozens and is written to initialise an Epson MX80 printer. It can easily be modified to initialise other printers by altering the strings following the comment defining the printer and console messages. By using this program in conjunction with MEMOP different fonts can be selected for output.

Another way of using different character sets for a whole document is to use *Polyprint* from Arcom software. This software uses the graphics mode of the printer and makes four passes to 'draw' each character.

The following table gives the possible values for the special printer type byte. The byte is used to select a built in device driver for the required type of printer. This byte is the 32 byte in the printer description record and is the one that is shown altered in the 'Printer type' panel. This byte can be altered for any printer, though it should be done only for those indicated in table 4.

Type	Suitable for
1	Non-fractional movement printers
2	C.Itoh Starwriter, Qume, Diablo *(see other types)*
3	All Epson and compatibles
4	IDS 460, 560, Prism
5	NEC Spinwriter 5510, 5520
6	NEC Spinwriter 5515, 5525
7	ProWriter, NEC 8023, C.Itoh 8510
8	RSDP II
9	Centronics 737
10	IBM Daisy, NEC Spinwriter (IBM model)
11	Qume 9/35
12	Oki Microline 84
13	IDS 480 micro prism
14	Toshiba 1350
15	MT 160L

Table 3. Special printer types with CONFIG.DAT

Different printers can be selected using a modified version of CONFIG. COM and this table shows how to select an appropriate printer. If your printer is not listed it may still be possible to implement it. Consult your dealer or a company such as BEL.

Printer	Equivalent in CONFIG
C.Itoh	Use the Pro10, Pro12, and Pros selections and change the special byte to 7.
Centronics	Choose appropriate model from menu.
DEC printers	Choose plain from menu.
Diablo	Choose appropriate model from menu.
Epson	This is the default.
HP matrix	Use default.
HP daisy	Choose equivalent Diablo model from menu.
IBM PC matrix	Use default.
IBM PC daisy	See 'Printer type' panel.
NEC 8023	Use the Pro10, Pro12, and Pros selections and change the special byte to 7.
NEC 3550	See 'Printer type' panel.
NEC 5510, 5520	Use spin10, spin12, spinps selections and set switches on printers.
Oki	Use plain and set special byte to 12.
ProWriter	Use the Pro10, Pro12, and Pros selections and change the special byte to 7.
Qume 935	Choose appropriate model from menu.
Qume	Choose equivalent Diablo model from menu.
RSD II	Choose appropriate model from menu.
Starwriter	Choose equivalent Diablo model from menu.
Toshiba	Use plain.
Xerox	Choose equivalent Diablo model from menu.

Table 4. Selecting different printers

If you want to use different character sets within a document there are more problems to be encountered. MEMOP will not allow this so you have to embed printer initialisation strings in the text and then use PIP to print the file. To do this enter your text as normal and then use the Quote key to embed characters in the text. Save the document on disc (eg, TEXT.TXT), exit MEMO and use PIP LST: = TEXT.TXT[Z] to print the file. As the quoted characters are found in the text they will be sent to the printer as literal characters and this will set the printer to the required font.

Quoted characters in the text will be treated as ordinary characters when shown on the screen, so the format of the document on the screen is not necessarily the one that will appear on the printer. Because of this it is good practice if using this method of output to put each initialisation string on a separate line of the document. Other methods of printing in different formats within a document are by using *Fancy Font* from PCML, which works in a similar way to *Polyprint*, or by using MPRINT from BEL, which is written for use with *MemoPlan* and works with the inbuilt character sets of the printer.

Speeding up MemoPlan

There are four main ways of speeding up *MemoPlan*.

Two of them can be accessed from the modified CONFIG program, the third can be implemented from the CCP and the other requires patches to be applied to the file MEMO. COM.

In the first two methods you use the modified CONFIG program to alter the message delay constant and the swap rate. The message delay constant is the amount of time elapsed before displaying any of the messages such as errors and a suitable value for this is 1. The swap rate is the time delay after typing before the text is saved to disc – a suitable value for this is 600, which gives about a ten second delay. This means that *MemoPlan* spends more time dealing with what you are typing than accessing the disc. It is also worth checking that the links at the front right of the keyboard have been set correctly for your disc drives. If you are in any

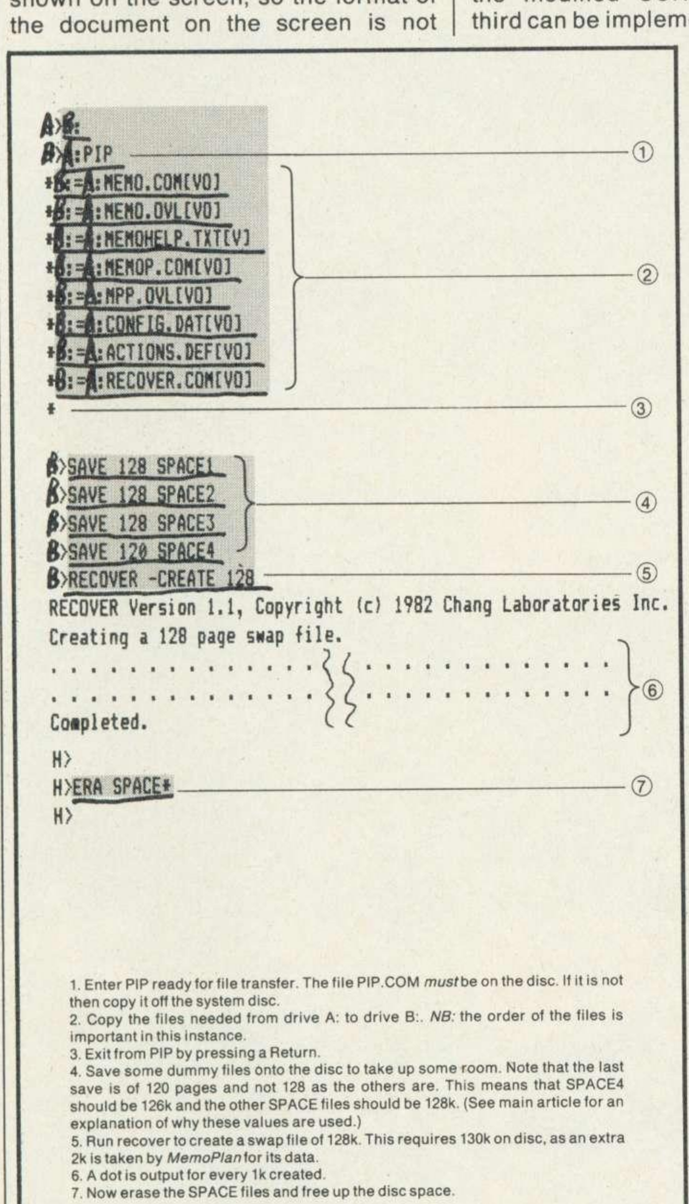
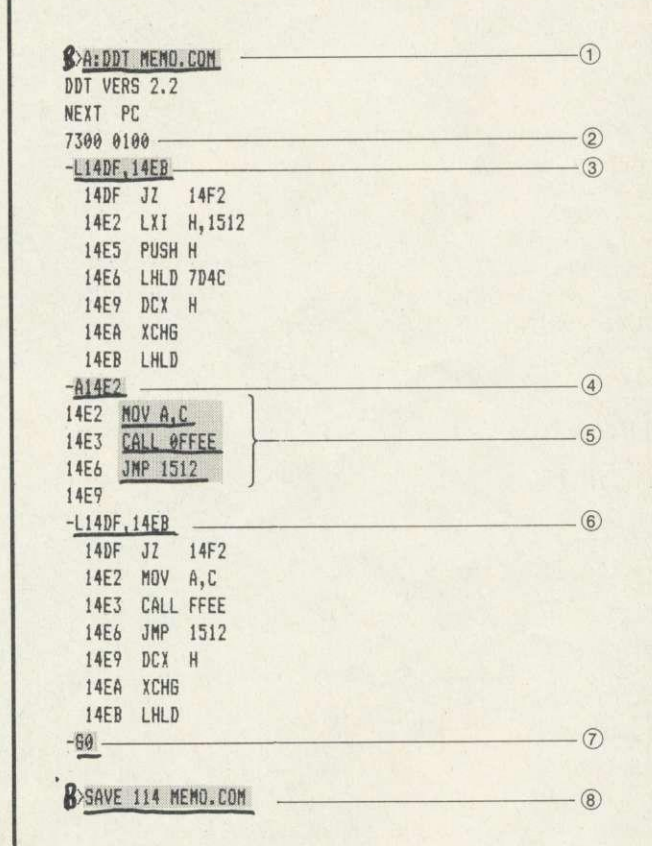


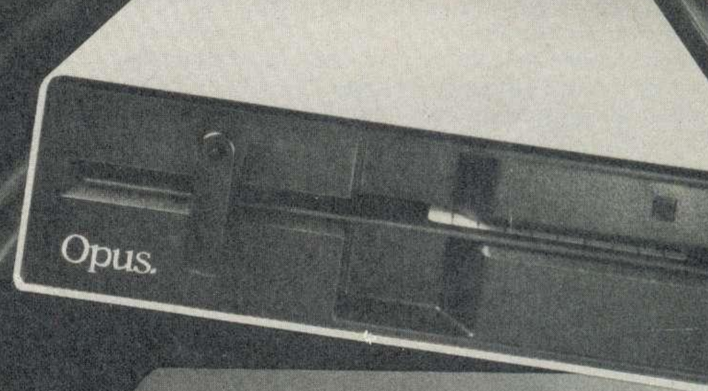
Figure 1. How to reduce disc head movement

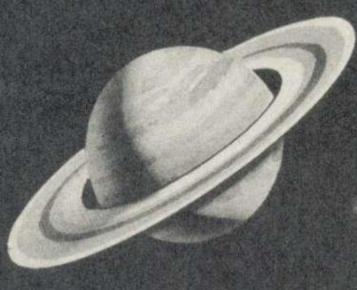


1. Enter DDT and tell it to load MEMO.COM ready for us to alter. DDT *must* be on the disc. If it is not copy it off the system disc.
2. DDT tells us that the file starts at 100H and ends at 7300H.
3. List the section of code that we are interested in. This is the start of a section of code that calculates the position of the write character routine in the CP/M BIOS.
4. Tell DDT that we are going to assemble some code at location 14E2.
5. Input the new instructions. Don't forget the 0 in front of FFEE.
6. List the section of code again to check that the alteration was done correctly.
7. Return to CP/M. This can also be done by typing CTRL C.
8. Now save the new version of MEMO.COM. The value 114 is the number of pages calculated by subtracting 100H from 7300H, taking the top two bytes – ie, 72 – and converting them to decimal.

Figure 2. Speeding up character output

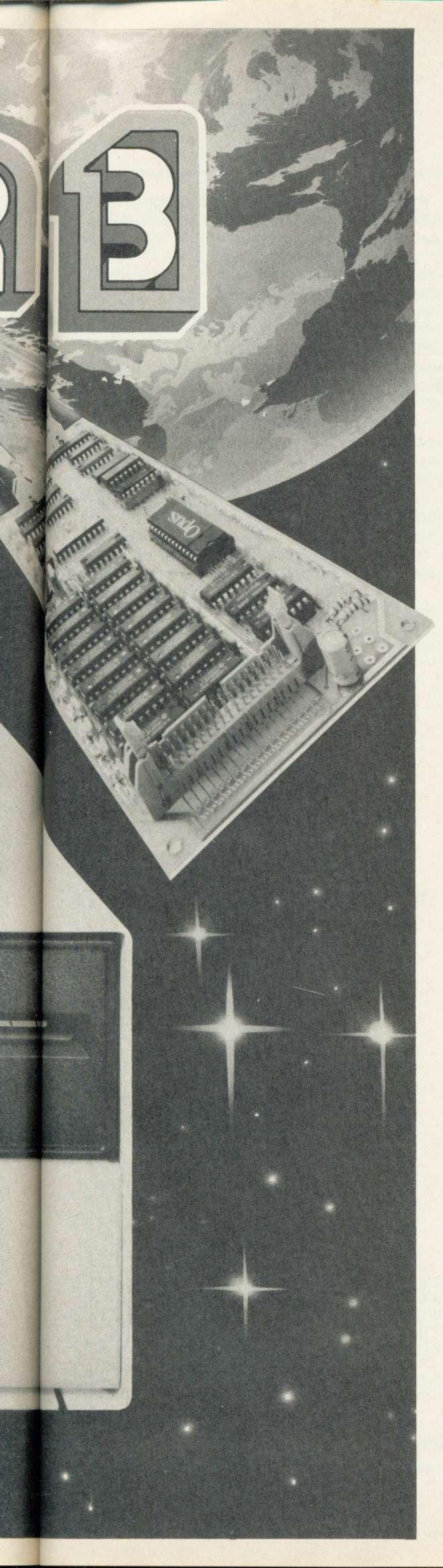
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CHALLENGER 13



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I enclose a cheque for £_______________ or please debit my credit card account with the amount of £_______________

My Access ☐ Barclaycard ☐ no. is: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

NAME _______________

ADDRESS _______________

____

TELEPHONE _______________

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doubt consult a reputable dealer.

The way that *MemoPlan* continually saves what you are typing can cause delays, as every time this is done the disc drive heads are moved to the file for writing and then returned to the area of the program or overlay file. This can involve considerable time and disc head movement. By following the procedure given in figure 1 on page 127 you will see the swap file is located on the opposite side of the disc to the program files and the disc heads do not have to move so much, which makes things quicker and quieter.

Finally, it is possible to speed up the way characters are output on the screen. In the version of *MemoPlan* supplied by Acorn character output is performed by calculating the location of the BIOS character out routine and using this. In the first article we discussed the way that CP/M calls the MOS routines to perform its tasks. By using this knowledge we can bypass the BIOS character out routine and call the MOS character out routine directly, which speeds up the display of characters. This technique should not be used with any programs you wish to use on other CP/M machines as it does not work on them. To bypass the BIOS character out routine the patch given in figure 2 to speed up character output should be used.

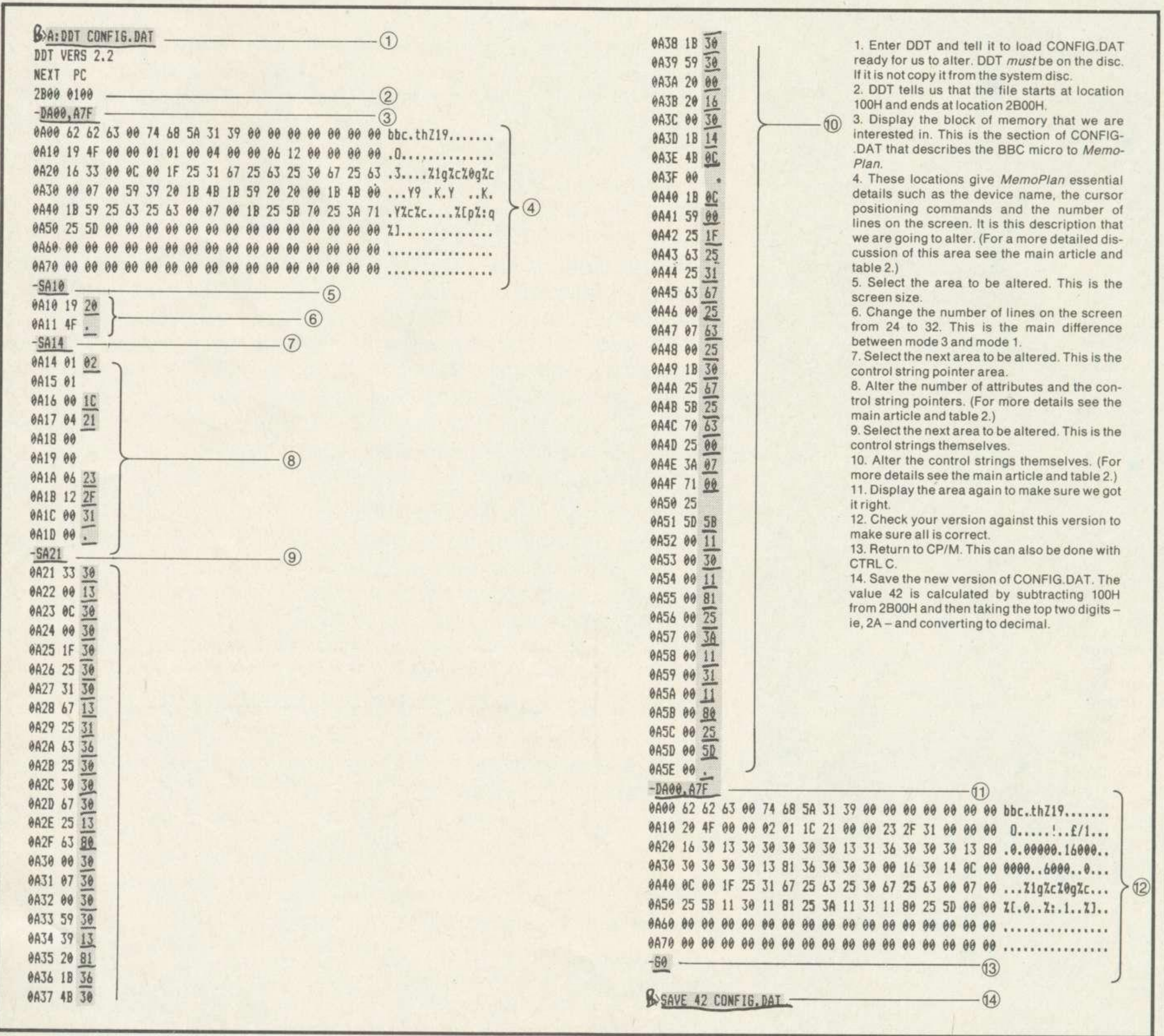
Improving the display

The patches given in figures 3 and 4 to alter the screen parameters and alter the sign-on message are ways of improving the screen output. The latter allows you to add that personal touch to your own version of *MemoPlan* by specifying a display string when the program starts up.

The patches given in figure 3 are more complex and table 2 explains the meaning of the values. I have provided a different display from Acorn's to make better use of the screen. Once the patches are installed you will find that you have a screen that is 32 lines long as opposed to 24, has highlights for different parts of the screen, and uses colour.

If you want to use different colours the bytes at A24H, A2AH, A2FH and A35H should be altered to what you require. In addition the screen is now cleared when you leave *MemoPlan*. However, if you don't want this to happen, change byte A16H to 0.

The CONFIG.DAT file specifies the environment that *MemoPlan* is to run in and as such it is quite complex in its structure. Because it is so complex, I have only touched upon the important features of the file and have provided working examples of alternative set-



```
B>A:DDT CONFIG.DAT                                                   (1)
DDT VERS 2.2
NEXT  PC
2B00 0100                                                            (2)
-DA00,A7F                                                            (3)
0A00 62 62 63 00 74 68 5A 31 39 00 00 00 00 00 00 00 bbc.thZ19.......   (4)
0A10 19 4F 00 00 01 01 00 04 00 00 06 12 00 00 00 00 .O..............
0A20 16 33 00 0C 00 1F 25 31 67 25 63 25 30 67 25 63 .3....%1g%c%0g%c
0A30 00 07 00 59 39 20 1B 4B 1B 59 20 20 00 1B 4B 00 ...Y9 .K.Y  ..K.
0A40 1B 59 25 63 25 63 00 07 00 1B 25 5B 70 25 3A 71 .Y%c%c....%[p%:q
0A50 25 5D 00 00 00 00 00 00 00 00 00 00 00 00 00 00 %]..............
0A60 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
0A70 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
-SA10                                                                (5)
0A10 19 20                                                           (6)
0A11 4F .
-SA14                                                                (7)
0A14 01 02                                                           (8)
0A15 01
0A16 00 1C
0A17 04 21
0A18 00
0A19 00
0A1A 06 23
0A1B 12 2F
0A1C 00 31
0A1D 00 .
-SA21                                                                (9)
0A21 33 30                                                           (10)
0A22 00 13
0A23 0C 30
0A24 00 30
0A25 1F 30
0A26 25 30
0A27 31 30
0A28 67 13
0A29 25 31
0A2A 63 36
0A2B 25 30
0A2C 30 30
0A2D 67 30
0A2E 25 13
0A2F 63 80
0A30 00 30
0A31 07 30
0A32 00 30
0A33 59 30
0A34 39 13
0A35 20 81
0A36 1B 36
0A37 4B 30
0A38 1B 30
0A39 59 30
0A3A 20 00
0A3B 20 16
0A3C 00 30
0A3D 1B 14
0A3E 4B 0C
0A3F 00  .
0A40 1B 0C
0A41 59 00
0A42 25 1F
0A43 63 25
0A44 25 31
0A45 63 67
0A46 00 25
0A47 07 63
0A48 00 25
0A49 1B 30
0A4A 25 67
0A4B 5B 25
0A4C 70 63
0A4D 25 00
0A4E 3A 07
0A4F 71 00
0A50 25
0A51 5D 5B
0A52 00 11
0A53 00 30
0A54 00 11
0A55 00 81
0A56 00 25
0A57 00 3A
0A58 00 11
0A59 00 31
0A5A 00 11
0A5B 00 80
0A5C 00 25
0A5D 00 5D
0A5E 00 .
-DA00,A7F                                                            (11)
0A00 62 62 63 00 74 68 5A 31 39 00 00 00 00 00 00 00 bbc..thZ19.......  (12)
0A10 20 4F 00 00 02 01 1C 21 00 00 23 2F 31 00 00 00  O.....!..£/1...
0A20 16 30 13 30 30 30 30 30 13 31 36 30 30 30 13 80 .0.00000.16000..
0A30 30 30 30 30 13 81 36 30 30 30 00 16 30 14 0C 00 0000..6000..0...
0A40 0C 00 1F 25 31 67 25 63 25 30 67 25 63 00 07 00 ...%1g%c%0g%c...
0A50 25 5B 11 30 11 81 25 3A 11 31 11 80 25 5D 00 00 %[.0..%:.1..%]..
0A60 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
0A70 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
-G0                                                                  (13)
B>SAVE 42 CONFIG.DAT                                                 (14)
```

1. Enter DDT and tell it to load CONFIG.DAT ready for us to alter. DDT *must* be on the disc. If it is not copy it from the system disc.
2. DDT tells us that the file starts at location 100H and ends at location 2B00H.
3. Display the block of memory that we are interested in. This is the section of CONFIG-.DAT that describes the BBC micro to *MemoPlan*.
4. These locations give *MemoPlan* essential details such as the device name, the cursor positioning commands and the number of lines on the screen. It is this description that we are going to alter. (For a more detailed discussion of this area see the main article and table 2.)
5. Select the area to be altered. This is the screen size.
6. Change the number of lines on the screen from 24 to 32. This is the main difference between mode 3 and mode 1.
7. Select the next area to be altered. This is the control string pointer area.
8. Alter the number of attributes and the control string pointers. (For more details see the main article and table 2.)
9. Select the next area to be altered. This is the control strings themselves.
10. Alter the control strings themselves. (For more details see the main article and table 2.)
11. Display the area again to make sure we got it right.
12. Check your version against this version to make sure all is correct.
13. Return to CP/M. This can also be done with CTRL C.
14. Save the new version of CONFIG.DAT. The value 42 is calculated by subtracting 100H from 2B00H and then taking the top two digits – ie, 2A – and converting to decimal.

Figure 3. Altering the screen parameters

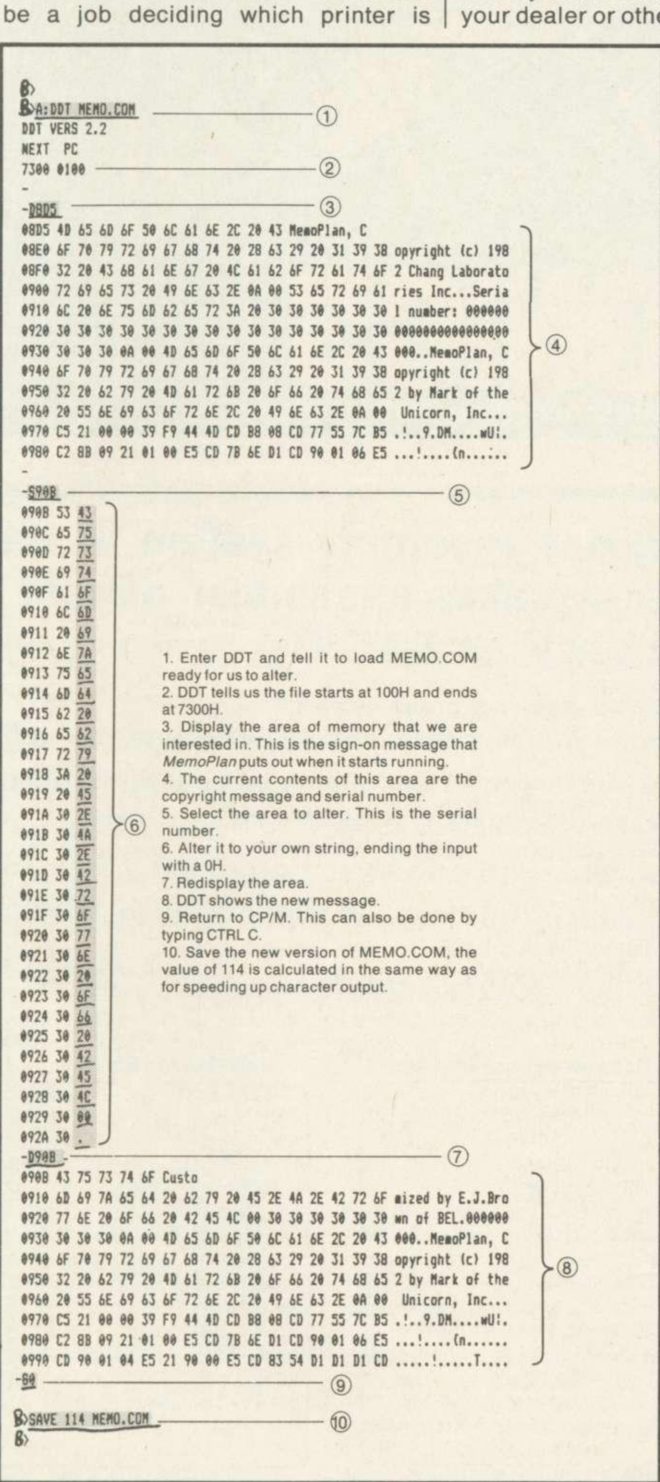
tings for the screen and printer. The dealer who supplied you with your Z80 should be able to assist you in configuring *MemoPlan* for your printer and screen but if you have any difficulty contact BEL.

Using different printers

Many printers can be used with *MemoPlan* and a good selection of these can be obtained from the CONFIG program. However, not all printers are listed in the menu and it can sometimes be a job deciding which printer is equivalent to your own. Tables 3 and 4 give a selection of printers and how to install them. For those that need the special printer byte to be altered the relevant information is given in figure 5. This special printer byte is a way of indicating to the *MemoPlan* print program MEMOP which of its special drivers it is to use. Most printers require some special processing to be done and this is the function performed by the drivers. Little can be said except that if you are having problems consult your dealer or other professional.

USEFUL ADDRESSES

Polyprint (£26 + VAT): Arcom Software, 45b Princess Road, Branksome, Poole, Dorset BH12 1BG. Tel: (0202) 762236.
MPRINT (£20): E J Brown, BEL, 12 The Chase, Marlow, Bucks SL7 1UU. Tel: (06284) 74801.
Fancy Font (£185 + VAT + P&P): PCML Ltd, Royal Mills, Esher, Surrey KT10 8AS. Tel: (0372) 67282.



```
B>
B>A:DDT MEMO.COM ———— ①
DDT VERS 2.2
NEXT  PC
7300 0100 ———— ②
-
-D8D5 ———— ③
08D5 4D 65 6D 6F 50 6C 61 6E 2C 20 43 MemoPlan, C
08E0 6F 70 79 72 69 67 68 74 20 28 63 29 20 31 39 38 opyright (c) 198
08F0 32 20 43 68 61 6E 67 20 4C 61 62 6F 72 61 74 6F 2 Chang Laborato
0900 72 69 65 73 20 49 6E 63 2E 0A 00 53 65 72 69 61 ries Inc...Seria
0910 6C 20 6E 75 6D 62 65 72 3A 20 30 30 30 30 30 30 l number: 000000
0920 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 0000000000000000
0930 30 30 30 0A 00 4D 65 6D 6F 50 6C 61 6E 2C 20 43 000..MemoPlan, C
0940 6F 70 79 72 69 67 68 74 20 28 63 29 20 31 39 38 opyright (c) 198
0950 32 20 62 79 20 4D 61 72 6B 20 6F 66 20 74 68 65 2 by Mark of the
0960 20 55 6E 69 63 6F 72 6E 2C 20 49 6E 63 2E 0A 00  Unicorn, Inc...
0970 C5 21 00 00 39 F9 44 4D CD B8 08 CD 77 55 7C B5 .!..9.DM....wU!.
0980 C2 8B 09 21 01 00 E5 CD 7B 6E D1 CD 90 01 06 E5 ...!....(n......   ④
-
-S90B ———— ⑤
090B 53 43
090C 65 75
090D 72 73
090E 69 74
090F 61 6F
0910 6C 6D
0911 20 69
0912 6E 7A
0913 75 65
0914 6D 64
0915 62 20
0916 65 62
0917 72 79
0918 3A 20
0919 20 45
091A 30 2E
091B 30 4A
091C 30 2E
091D 30 42
091E 30 72
091F 30 6F
0920 30 77
0921 30 6E
0922 30 20
0923 30 6F
0924 30 66
0925 30 20
0926 30 42
0927 30 45
0928 30 4C
0929 30 00
092A 30 .   ⑥
-D90B - ———— ⑦
090B 43 75 73 74 6F Custo
0910 6D 69 7A 65 64 20 62 79 20 45 2E 4A 2E 42 72 6F mized by E.J.Bro
0920 77 6E 20 6F 66 20 42 45 4C 00 30 30 30 30 30 30 wn of BEL.000000
0930 30 30 30 0A 00 4D 65 6D 6F 50 6C 61 6E 2C 20 43 000..MemoPlan, C
0940 6F 70 79 72 69 67 68 74 20 28 63 29 20 31 39 38 opyright (c) 198
0950 32 20 62 79 20 4D 61 72 6B 20 6F 66 20 74 68 65 2 by Mark of the
0960 20 55 6E 69 63 6F 72 6E 2C 20 49 6E 63 2E 0A 00  Unicorn, Inc...
0970 C5 21 00 00 39 F9 44 4D CD B8 08 CD 77 55 7C B5 .!..9.DM....wU!.
0980 C2 8B 09 21 01 00 E5 CD 7B 6E D1 CD 90 01 06 E5 ...!....(n......
0990 CD 90 01 04 E5 21 90 00 E5 CD 83 54 D1 D1 D1 CD .....!.....T....   ⑧
-G0 ———— ⑨

B>SAVE 114 MEMO.COM ———— ⑩
B>
```

1. Enter DDT and tell it to load MEMO.COM ready for us to alter.
2. DDT tells us the file starts at 100H and ends at 7300H.
3. Display the area of memory that we are interested in. This is the sign-on message that *MemoPlan* puts out when it starts running.
4. The current contents of this area are the copyright message and serial number.
5. Select the area to alter. This is the serial number.
6. Alter it to your own string, ending the input with a 0H.
7. Redisplay the area.
8. DDT shows the new message.
9. Return to CP/M. This can also be done by typing CTRL C.
10. Save the new version of MEMO.COM, the value of 114 is calculated in the same way as for speeding up character output.

Figure 4. Altering the sign-on message

1. Enter DDT and tell it to load MEMO.COM ready for us to alter.
2. DDT tells us that the file starts at 100H and ends at 2B00H.
3. Display the area that we are interested in – the Spin printers.
4. DDT shows us the three Spin printers, ten characters per inch, 12 characters per inch, and proportionally spaced.
5. Select the byte to be altered. This is the special printer byte. (For further details see the main article and table 3.)
6. Change the special printer type to IBM.
7. Redisplay the area to check that we got the alteration right.
8. Check your own display against this if you are using an IBM proportionally spaced printer.
9. Return to CP/M. This can also be done by typing CTRL C.
10. Save the new version of CONFIG.DAT. The value of 42 is calculated in the same way as in the screen parameters panel.

```
B>A:DDT CONFIG.DAT ———— ①
DDT VERS 2.2
NEXT  PC
2B00 0100 ———— ②
-
-D1900 ———— ③
1900 53 70 69 6E 31 30 00 00 00 00 00 00 00 00 00 00 Spin10..........
1910 56 54 24 6D 15 00 35 00 00 00 FE 00 A7 01 00 05 VT$m..5.........
1920 00 00 FF FF FF 00 00 00 00 00 01 00 00 00 00 0D ................
1930 0A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1940 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1950 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1960 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1970 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1980 53 70 69 6E 31 32 00 00 00 00 00 00 00 00 00 00 Spin12..........
1990 56 54 24 6D 15 00 35 00 00 00 D4 00 A7 01 00 05 VT$m..5.........
19A0 00 00 FF FF FF 00 00 00 00 00 01 00 00 00 00 0D ................
19B0 0A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
-D
19C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
19D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
19E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
19F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1A00 53 70 69 6E 50 53 00 00 00 00 00 00 00 00 00 00 SpinPS..........
1A10 56 54 24 6D 15 00 35 00 FF 02 D4 00 A7 01 00 05 VT$m..5.........
1A20 00 00 FF FF FF FF 02 00 00 00 01 00 00 00 00 0D ................
1A30 0A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1A40 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1A50 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1A60 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1A70 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................   ④
-
-S1A1F ———— ⑤
1A1F 05 10 ———— ⑥
1A20 00 .
-D1A00,1A7F ———— ⑦
1A00 53 70 69 6E 50 53 00 00 00 00 00 00 00 00 00 00 SpinPS..........
1A10 56 54 24 6D 15 00 35 00 FF 02 D4 00 A7 01 00 10 VT$m..5.........
1A20 00 00 FF FF FF FF 02 00 00 00 01 00 00 00 00 0D ................
1A30 0A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1A40 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1A50 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1A60 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
1A70 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................   ⑧
-G0 ———— ⑨

B>SAVE 42 CONFIG.DAT ———— ⑩
```

Figure 5. Altering the printer type

Bar code software launched for school libraries



MEP barcode reader: can now be used in school libraries

A BAR code compatible version of software for school libraries has been launched by Wilson Software.

Schools and colleges of up to 2000 pupils can produce bar code reader tickets and book labels – you'll need a BBC B micro, twin disc drive, Epson compatible printer and MEP bar code reader.

It's available in ROM or disc format at about £40 from Wilson Software, Freepost, Ormskirk, Lancs. Tel: (0695) 72449.

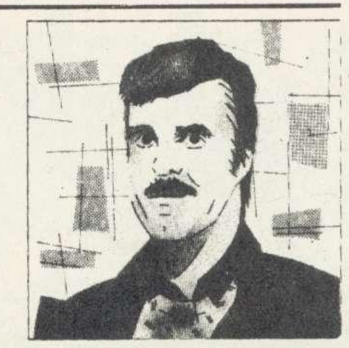
More software due from MEP region

THE Resource initiative from MEP South Yorks and Humberside released another set of materials at the end of June – the third such launch in two years, with two more due in October and December.

As a non-profit-making organisation the terms available to local authorities for licensing arrangements are very attractive. The software is broken down into major packs containing on average five software items. Licences for copying any pack-set within an authority start at £75 for authorities with less than 25 secondary schools, rising to £150 for those with over 150.

The type of software covers primary, secondary and special education, right across the curriculum. More details are available from Dr Peter Avis, MEP Regional Centre, Exeter Road, Doncaster DN2 4PY. Tel: (0302) 63784.

Commentary by Nick Evans, who welcomes reader feedback



Banks fight it out in schools

BANKS are racing to attract young customers with free gifts of bags, pens, stationery and other 'carrots'. Behind the scenes, however, a much bigger fight is on – to enlist schools into the banking service and put the bank's name in front of the children at every opportunity.

The front runner appears to be the Midland with their Midland Computerised School Banking System now in many schools across the country.

The system comprises a disc of software, a ring binder containing the manual and a free copy of *A First Computer Dictionary*, and the idea is to provide three main levels of use.

First, it can be used in conjunction with any banking facility the school may operate for its pupils – providing that the account is with the Midland, of course. The daily accounting for that bank may not only be handled by the micro but also recorded in printed form, which may then be used as the accounts for the school balance.

Second, it may be used for other local accounting purposes, such as school trips, or fund-raising activities. Third, the actual mechanics of the program's operation, other than the actual listing, may be studied in Computer Science classes.

All the usual tasks that a school banker has to undertake are covered – deposits, withdrawals, new accounts, closures, end of day, as well as facilities to print out statements of transactions for individual pupils and to store 'full' files – 10 transactions is the maximum before a file has to be cleared.

The program is easy to use and requires no particular computer skill. It's menu-driven and protected with passwords which prevent unauthorised access to information held on the files. The facilities for searching for records are comprehensive, including surname, part name and account number searching.

The system is self-checking, even to the extent of verifying whether the date entered at the beginning of the day is correct.

Overdrawing of an account is not allowed and the program will warn you if this is about to occur.

The manual is detailed and readable – so newcomers to the micro should not have any problems. Advice on rotation of discs is given, complete with a record table to show the 'grandfather, father, son' progression of file-handling technique.

All in all this is a useful system which will find a place in many schools both as an actual banking system and as a utility in other areas of the school's activities.

Bugs cured in LSL Logo

LSL has brought out a new improved version of their Logo implementation and claim many of their features now rival and even out-do their competitors. The original package received a bad press, especially from the main Logo user group.

Logotron's version – noted for its speed – is rivalled and indeed overtaken, according to LSL, by its product on such tests as recursion, trigonometry and real number arithmetic.

The 1.2 version has three new primitives (TO, MakeList, SEntence) and the 'no room' bug in the 1.0 version has been cured. There is also a utilities disc with turtle drivers and a printer screen dump. Details and benchmark tests are available from LSL, 316a Richmond Road, Twickenham, Middlesex TW1 2PD. Tel: 01-891 0989.



Two Logo implementations: can the new LSL version rival Logotron's for speed?

Why no Acorn 16-bit?

WITH ASK now working on the 16-bit MEP contract for machines which are gradually filtering into schools, as well as producing a combined database and graphics editor, isn't the time right for Acorn to be seriously producing some sort of machinery that will be able to implement similar materials?

Financial problems and the B+ argument aside, Acorn is now being sadly left behind in what is, admittedly, a minority area in education at the moment – but for how long will it remain so?

Stand out in the crowd

EDUCATION centres and teachers' resource centres across the country receive a good deal of literature and software from many areas of computing, but one particularly salutory incident occurred recently when Ginn and Co sent out free review copies of software to my local centre.

The package consisted of discs packed with multiple programs – not the production versions – and poorly photocopied editions of the original documentation. The company obviously felt that it was saving money by sending these versions out – presumably to all 109-odd authorities in the country. The reaction of the centre's manager was to demand that they take it back.

This is not surprising since it would have been left to him to sort out the mass of information, and to present it in its unattractive form to prospective users. As it is unlikely these rough packs would impress potential buyers the exercise was pointless.

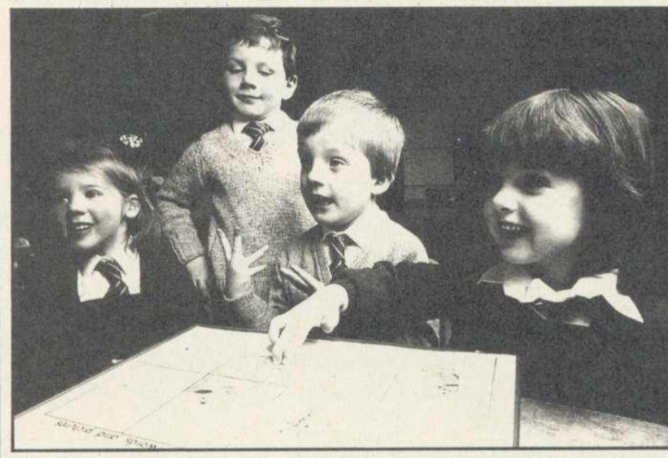
Other software companies send out production copies – packaging and all. Anything else doesn't get looked at because the volume of materials handled is so vast. So please, publishers, make software managers' jobs a little easier – they're promoting your goods!

Magazine to aid Maths teachers

MICROMATH, a new journal from the Association of Teachers of Mathematics (producers of *L – a Mathemagical Adventure*), is finding a market among its members who, despite having been 'saddled' with responsibility for computers in the early days of computing, have since discovered that there is little useable software available for them apart from programming languages.

Micromath helps to overcome their difficulties with articles on all aspects of computers in mathematics. The line-up of editors and writers is impressive with names like Professor Celia Hoyles, Derek Ball, John Wood and Adrian Oldknow featured. It is published through Basil Blackwell, Oxford.

'Talking-box man' speaks out



The Concept Keyboard (pictured) and a Type and Talk speech synthesiser are Mike Doyle's Audiotext tools

THE 'talking-box man' – that's what many teachers call Mike Doyle from Skipton, who has pioneered work in the ways primary children use the computer as a means of linguistic interaction.

He uses the Concept keyboard and the Votrax 'Type 'n' Talk' speech synthesiser, or the cheaper Namal SC10 'Type & Talk' from Cambridge Microcomputer Centre, both of which accept data from the computer in much the same way as a serial printer.

Audiotext

This 'audiotext', as Mike calls it, provides a monotonous but quite acceptable speech synthesis, which is a half-way house between written and oral communication.

He uses the Concept keyboard for input as it side-steps the problems of conventions written into programs for keyboard input, which often confuse small children. Moreover the keyboard overlay conveys graphically the information required.

He writes: 'The addition of audiotext had even more dramatic consequences. No longer were messages confined to writing on the screen. The screen display could be simplified and a whole host of helpful little auditory prompts introduced; prompts which would have gone unread or unnoticed if printed.'

He continues by describing the combining of his enhanced BBC with Dart and a Jessop Turtle, modified by having the top removed and a large protractor incorporated in its place.

'The Concept keyboard meant that I could give graded access to Logo. For the youngest children, a simple overlay with FORWARD, LEFT, RIGHT, HOOT and RUN; the codes assigned to these keys not only drove the Turtle but automatically added that command to a procedure being BUILT, so that the child could re-run the journey at the touch of RUN.

'Then followed a series of increasingly complex overlays; setting distance, then heading, using a calculator-style number pad. Using an UNDO command to recover from crashes into farm buildings, finally reaching an overlay with all the commands available in DART+.

Success

'Audiotext was essential to the success of this enterprise. The children were working with numbers well beyond their arithmetic skill level. The turtle, rushing lemming-like from the table, established that numeral order was important – 71 was different from 17 – but Audiotext was essential in establishing which was 'seventeen'.

'Again, as the turtle executed the procedure built up in direct drive, the audiotext "said" what was happening. If the only form of linguistic communication had been via the screen this whole exercise would not have been educationally viable.'

Mike's thesis is that the low quality of much educational software for the primary sector is due to the limitations of the current hardware. His enhancements have allowed him to achieve what would normally be impossible with that age range – despite the hardware – and he argues for specialised technology which will allow a structure that is purpose-designed for the needs of the primary child.

Further correspondence on this topic and related information on the use of audiotext will be very welcome.

Education Top Ten

		Title	Publisher	Cassette	Disc	ROM	Electron	Shadow on B+	6502	Econet
1	(re)	French Mistress A and B	Kosmos	£8.95	£7.95	—	Yes	Yes	—	—
2	(2)	Pan 'O' Level (series)	Hill McGibbon	£14.95	£19.95	—	Yes	Yes	—	—
3	(7)	German Master A and B	Kosmos	£8.95	—	—	Yes	Yes	—	—
4	(4)	Music System	Island Logic	—	£29.95	—	—	Yes	—	—
5	(9)	Podd	ASK	£9.95	£11.50	—	Yes	Yes	—	—
6	(5)	Mr T (series)	Ebury	£9.95	—	—	Yes	Yes	—	—
7	(8)	First Steps with Mr Men	Mirrorsoft	£8.95	£11.95	—	Yes	Yes	—	—
8	(-)	Spanish Tutor A and B	Kosmos	£8.95	—	—	Yes	Yes	—	—
9	(1)	Best Four – Maths	ASK	£19.95	—	—	Yes	Yes	—	—
10	(-)	Read Write Away (series)	Highlight	£7.95	£11.95	—	Yes	Yes	—	—

Compiled by RAM/Computer from a panel of specialist dealers

Contact publishers: Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Beds; Hill McGibbon, St Bartholomew House, 92 Fleet Street, London EC4; Island Logic System, 12 Collegiate Crescent, Sheffield S10 2BA; ASK, London House, 68 Upper Richmond Road, London SW15 01-874 6046; Ebury Software, National Magazine Co, 72 Broadwick Street, London W1; Mirrorsoft, Mirror Group Newspapers, Holborn Circus, London EC1P 0DQ 01-353 0246; Highlight Software, 36 Sherbourne Close, Barry, South Glamorgan CF6 5AQ (0446) 745482

CAUGHT IN THE NETWORK SPELL

Chris Drage and Nick Evans look at what's around

NETWORKS are used in many schools but what are the problems and joys associated with them? The most common reason for choosing a network is for multi-distribution of software and the sharing of peripherals, which is quite understandable in the current economic squeeze. A network contributes greatly to the provision of computer assisted learning, computer support and general computer awareness across the curriculum and is cost effective.

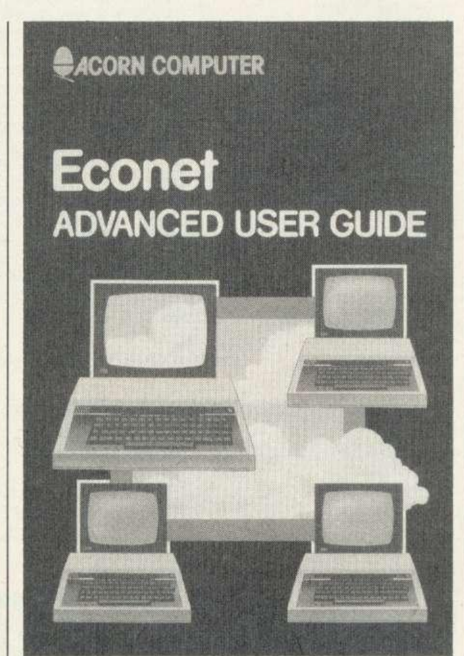
The 'official' network for the BBC micro is the Econet system – produced by Acorn and guaranteed compatible with the rest of the hardware. The Level Three version is now available – with 10-megabyte storage on a Winchester disc it will cost around £1499 plus £200 for the software. If you are really greedy for storage then the 30-megabyte disc will set you back £2299 plus £200.

A further facility is the capability to link two networks together using 'The Bridge', so that both work from one common fileserver. Acorn reckon that in this way it can link 127 separate networks together – although I bet they haven't tried. This sort of system is useful if two campuses need to be linked together on a split-site school.

What about software? Well, software that is Econet-compatible is a significant enough problem in itself – because of protection or the way the software is configured, it is often not possible to distribute it on the network. Add to that the fact that manufacturers do not like their packages to be compatible because it makes piracy easy and you have a classic vicious circle. The amount of software that has been written specifically to exploit the facilities of the network is minimal – I understand that System is working on a sulphuric acid plant simulation which uses separate stations for different parts of the process; Humberside authority and MEP have a random access database up and running; and there are the networked local viewdata systems – but there is little else.

Andrew Lovett, Chris Park and Mark Saunders of the University of Lancaster's Department of Geography wrote to me to explain their use of the Econet Level Two system:

'Our students have generally found Econet easy to use and have become



Econet: the 'official' network for the BBC micro but far from the only one

quite adept at accessing programs via the fileserver. We have found, however, that if more than 15 users are trying to access a program at once then the speed of response from the fileserver slows down considerably and may exceed three minutes. A more important limitation is that there is no means of queuing output to the printer server and consequently it's awkward to use the printer with a large class.

'One annoying feature is that there is no simple command to copy a file and this can only be done using the NETMGR facility to duplicate the contents of a directory. For teaching purposes it would be useful if it was possible to take over the screens of all stations simultaneously. At present the *REMOTE command limits this operation to one station.'

However, Econet is not the only option available.

At New College, Swindon, a Winchester-based E-Net distributed network is being imaginatively used. It was felt that the Schoolfax viewdata system provided a far more friendly and useful interface than the standard 'Please enter your number/password' (see *Acorn User* August 85, page 133). A viewdata file of 4500 pages has been produced. Some 150 pages of the file are updated daily using the automatic download from Ceefax and Oracle. Between 8.30 and 9.00am a group of students edit these new pages simultaneously, so that by the start of the college day, up-to-date national and financial news, weather, sport, college news and travel information are available on the network. A further 10 to 20 pages are updated less frequently.

Unlike many systems, Schoolfax is not static. There are many educational advantages to be found in the production and maintenance of view-databases by students. An 'editorial board' of students is responsible for the maintenance of the file, and they encourage both staff and students to become information providers.

Smaller files can also be called up by users. Furthermore, both individual files, made to reflect the individual needs of staff and students, and subsets of the main file can be provided to run on stand-alone BBC micros. There is also a college news file which carousels in the refectory. The database is used because the information is either valuable or interesting.

There is no question that using the Schoolfax viewdata facility on the network has greatly enhanced computer provision at New College. The possibilities for further developments in many areas of the curriculum are exciting.

Sideways RAM

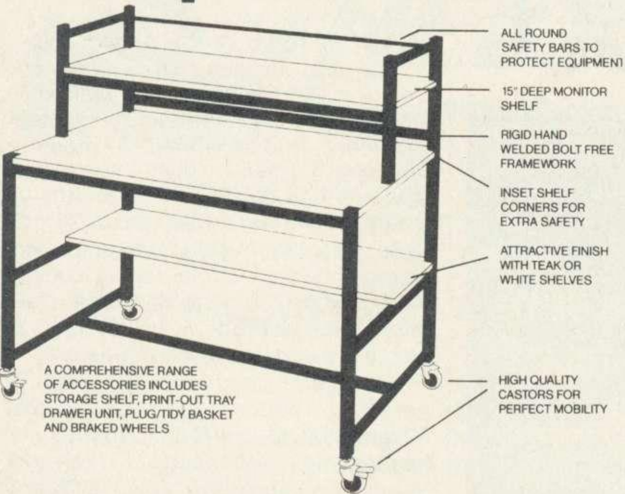
Using sideways RAM on the network is a topic of interest to many educational users and one which Acorn is not keen to discuss. Indeed it will not sanction its use with Econet. However, there are considerable advantages in using sideways RAM in each station. After the initial purchase of the RAM boards only one unit of each software package need be bought. The problem with ROMs in the school environment is that they are frequently the target for thieves. ROM-image software on disc is not only secure but gives each network greater flexibility.

Steve Smith of Lancaster ITEC reports enthusiastically that the ATPL Sidewise board works extremely well on their Symbnet network. Each board is fitted with 16k of RAM and a write protect switch to prevent overwriting of RAM contents.

Bosworth Community College uses

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The IMAGE III Frame Store turns your BBC computer into a low cost image processing system and opens up a range of possibilities such as Robotic Vision, Medical Imaging, Factory Inspection etc. Alternatively the store can be used in applications where picture data is arriving slowly, eg weather satellite transmissions, ultrasonic imaging, enabling the user to have a steady display without the need for long persistence display devices.

IMAGE III plugs directly into the 1MHz bus on the BBC micro, and is supplied with a comprehensive software package which demonstrates the features of the store.

Price: £1,990 plus VAT

IMAGE III is also available for the IBM PC and Apple computers.

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The TV Picture Store Board used in IMAGE III was developed by British Telecom Research Laboratories and is manufactured under licence by Eltime Ltd.

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20-way	£1.90	£1.35	£1.20
26-way	£2.40	£1.60	£1.45
34-way	£3.10	£1.95	£1.60
40-way	£3.40	£2.00	£1.85
50-way	£3.85	£2.25	£2.00
60-way	£4.80	£2.60	£2.25

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50-way	£2.30	£2.65
60-way	£2.45	£2.85

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VISA

Ramamp Computers' 16k RAM boards with great success. Jim Houghton, a lecturer at the college, writes:

'We are currently using an E-Net computer network of BBC micros consisting of 50 possible outlets in 30 different rooms within the College. At present we have 34 micros in three groups of 12, six and six with the remaining 10 dispersed around the College, but all on the network.

'As a College we are dedicated to developing information technology across the whole curriculum, hence the very dispersed nature of the network.

'As a direct result of this philosophy, we quickly ran into the problem of providing a good wordprocessing facility. From our research, it became obvious that the only satisfactory solution was to use ROM-based software, such as *View*, *Wordwise* or *Edword*. However, supplying software in local ROM form on a wide scale denied the very concept of a distributed network. The next step was to look at the idea of using this ROM-based software in sideways RAM boards, installed in each machine. We found that those boards that used dynamic RAM were significantly cheaper, and so chose 16k boards from Ramamp Computers.

'The company was helpful in lending us three boards on trial before we committed ourselves to buying 20. We have not looked back since, as the sideways RAM appears to be stable and easy to load; it is robust and text files survive soft and even hard breaks!

'These boards are simplicity itself to install. None of them has failed, and only occasionally have the contents of the RAM become corrupted – probably due to extraneous causes. We now plan to fit the remaining machines with identical boards and are actively pursuing licences for ROM based software, although some is looking a little pricey for the network versions. However, it has meant that we can use professional quality software on a distributed basis on a BBC network.

'We are well pleased with the results and the addition of simple menu programs has made the operation very user friendly.'

A cost-effective network

Good news for schools who obtained an RML 380Z under the Department of Trade and Industry scheme but later purchased BBC micros as a more cost-effective means of computer provision. That old 380Z can be pulled out of its cupboard, dusted down and pressed into service once again thanks to Meadnet – a cheap alternative to Econet that uses the 380Z as a network controller serving up to 16 BBC micros.

Although two different types of micros are used in this system, no special hardware is needed for the BBC micros as the user port is used for all network communications. The 380Z does need an extra board slotted into its rack. It also requires at least 32k of RAM and twin double-sided single density drives. An external network box connected to the file server provides the sockets to run a 'star' network. Each BBC micro on the network requires filing system software (in EPROM). As the system costs £275 plus £20 per station this seems almost too good to be true. What do users think? I decided to find out from several schools in Berkshire and Oxford.



School fax: encourages students to become information providers

Hints and tips

From conversations with a number of practicing educationalists here are a number of points which may be of some help to those purchasing a network system.

Secure a maintenance contract which ensures a 24-hour turn-round on repairs. The network becomes indispensible once established!

A Winchester hard disc backing store is essential for all but the smallest of networks, and indeed has been described by E-Net and Symbnet users alike as 'the power of the system'. The essential element when dealing with hard disc storage is to utilise a flexible back-up system. In fact many people expressed the wish to use an exchangeable cartridge system (say 5mb) thus enabling each network controller to be responsible for his or her own backing-store maintenance – giving a greater degree of autonomy to each. Tape streamer back-up is a worthwhile investment on a large network: six minutes to back-up a 21mb hard disc. Organising floppies can cause headaches.

Some general comments:

- Advantages accrue for girls who are able to interact without competing with boys.
- Software compatibility is a major factor in choosing a network.
- Most problems encountered initially are due to bad installation.
- Small local networks (1/4mb storage per group), may be preferable to one large network in terms of the ease of administration and disc management.

At St Augustine of Canterbury Upper School in Oxford nine BBC micros are networked. Mobility of each micro is important and the Meadnet star system has been found to be ideal. Computers may be withdrawn at any time and used as stand-alone machines. At Meadway School, Reading, economics dictated the choice of network. Meadnet has proved to be both a reliable and cost-effective means of networking their 16 Beebs, its main limitation being its maximum cable length of 20 metres.

James Nalty at Easthampstead Park School reports favourably on Meadnet. Chosen because of its low cost, he envisages that it will be superseded in a couple of years by a more sophisticated distributed network.

He finds Meadnet's strength lies in its simplicity. He states that the system has really opened up computer studies, wordprocessing and information retrieval. Mr Nalty heads the Berkshire Meadnet Support Group which meets to help overcome users' problems and identify good software. You can contact him for information on Times Network For Schools mailbox YLH026 or (0734) 862639 (7.30 to 8pm).

There is unequivocable praise and appreciation of Meadnet from all its users, and unanimous agreement on its reliability and the excellent support of the system by its manufacturers.

ADDRESSES

Econet
Acorn Computers, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.

E-Net Network
Amcom, 34 Charters Lane, Kiln Farm, Milton Keynes MK11 3ET.
Tel: (0908) 569212.

Schoolfax Local Viewdata System
Schoolfax, 24 Somerset Road, Swindon, Wiltshire SN2 1NF.
Tel: (0793) 695296.

Sidewise ROM Expansion Board
ATPL, Station Road, Clowne, Chesterfield S43 4AB.

16k Sideways RAM Card
Ramamp Computers, 25 Avon Drive, Whetstone, Leicester.
Tel: (0533) 864966.

Meadnet Local Network
Richmead Micro, 29 Easby Way, Lower Earley, Reading, Berkshire RG6 3XA.
Tel: (0734) 665771.

PROJECTING AN IMAGE

Martin Phillips adds Notice Board and Vufoil production facilities to his Easyplot programs

BY USING the Notice Board program a series of pictures produced with the *Easyplot* programs featured in the past two issues can be sequenced into an ever-changing display. This is designed to work on both the BBC and Electron computer, and can be used with either cassette or disc. It can be used as a notice board for displaying information in schools and clubs and at meetings.

Once the picture has been drawn it will remain on the screen for the time set at the start of the program, and when a series of pictures has been displayed the program returns to the start of the sequence. Pictures can be included in any sequence and shown as many times as you like within a given sequence. Up to 29 pictures can be included in a sequence, although this can be increased – see later section.

The program disables the Escape key and the keyboard to prevent interference. Pressing the Break key will reset the program.

Once a collection of pictures has been drawn a list must be made of their filenames and the mode in which they run. Then put all the files together on one disc, making sure that no picture takes up more than 2.5k of memory. This would be the case only if some form of memory expansion such as the 6502 second processor had been in use on the machine.

To check that all the files on a disc are under 2.5k, insert the disc and type:

```
*INFO *.*
```

'Pictures can be included in any sequence and shown as many times as you like'

This lists all the files, each of which will be followed by four numbers. The third gives the length of the file in hexadecimal. This should be under 9C4 (or 2500 in denary). For each picture the mode followed by the filename then needs to be entered into the data statements at the end of the listing. Four screen titles have been included as an example (part of this sequence is illustrated on page 141) and these should be replaced by your own filenames. The last data line must not be altered, as this tells the computer that it has finished reading all the data.

To show a sequence of filenames in the order BOAT (mode 1), MESSAGE (mode 5), MAP (mode 0), TEXT (mode 1), the data statement would need to be:

```
DATA 1,BOAT,0,MAP,1,TEXT
```

The blank lines are available for extra data statements if needed. Notice there is no comma at the end of the line. The program can then be saved to disc using the filename NOTICE. By entering the sequence of filenames into the data statements you can modify the sequence, leaving out pictures or including new ones or run the same picture several times in a sequence.

To get the disc to auto-boot type:

```
*OPT4,3
```

followed by:

```
*BUILD !BOOT
```

The disc drive will switch on and the number 1 will appear on the screen. Then type:

```
1 *FX15,0
```

and press Return. Line number 2 now appears. Enter the following:

```
2 CHAIN"DISPLAY"
```

and press Return. Line number 3 now appears. This time press Escape. To run Notice Board now press Shift and, while that key is pressed, hit the Break key until the disc drive switches on. Release the Break key, followed by the Shift key. The program should then show the title and ask for a time delay in seconds. Once this has been entered the pictures will start to be displayed.

The *FX15,0 call empties all the buffers. Characters in the keyboard buffer can sometimes have an odd effect when a disc is auto-booted, so it is worth including this line. When run from disc the program will relocate down to &1300 to give more room for the picture files. Don't try to go lower, as some disc workspace is required.

Using tape

Notice Board can be used with tape, but it is not possible to repeat the sequence without rewinding the tape or recording

several sequences on one tape. On the tape, the program NOTICE must be placed first and each picture saved in the order in which it is to be displayed. A picture being repeated several times throughout the sequence must be resaved at each appropriate point. Note that it is not possible to auto-boot a tape. The files start loading as soon as one picture has been drawn. For BBC machines with no disc filing system fitted, line 200 should be changed to read:

```
200 *KEY10 OLD|M RUN|M
```

Extending to 60 files

The disc catalogue limits the maximum number of files possible to 31, and as one is needed for the run program and one for the !BOOT file, only 29 files can be used for pictures. If one of the alternative disc filing systems is available which allows more than 31 files, then up to 60 files can be stored on a single disc.

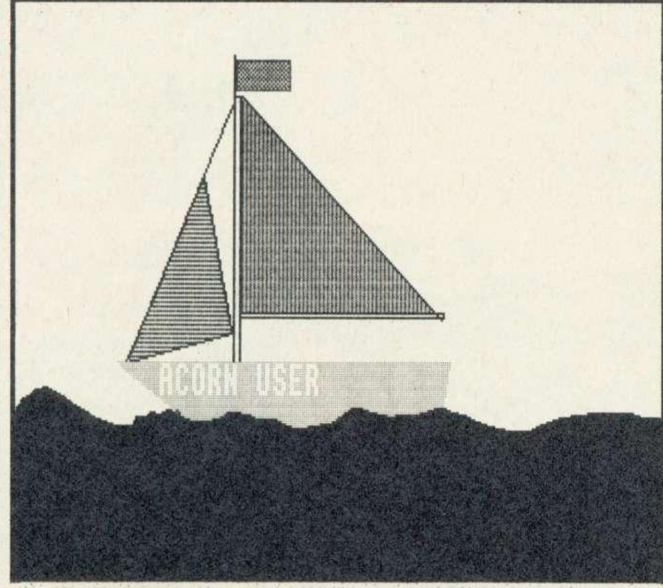
As the program stands it will accept 60 files. There is no reason why a double-sided disc drive or a twin disc drive could not be used to store the 60 pictures. To call them up the filename must also include the disc drive number, if it is not 0. Thus for a picture called 'JUNK' stored on drive 1, the filename would be:

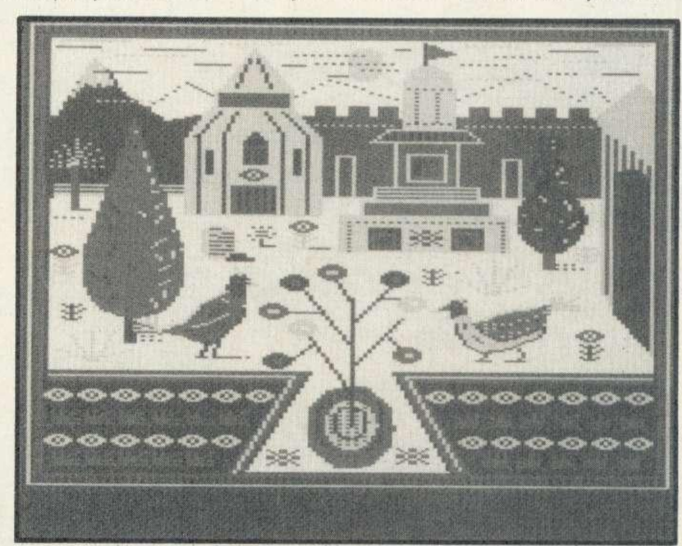
```
:1.JUNK
```

Vufoil display

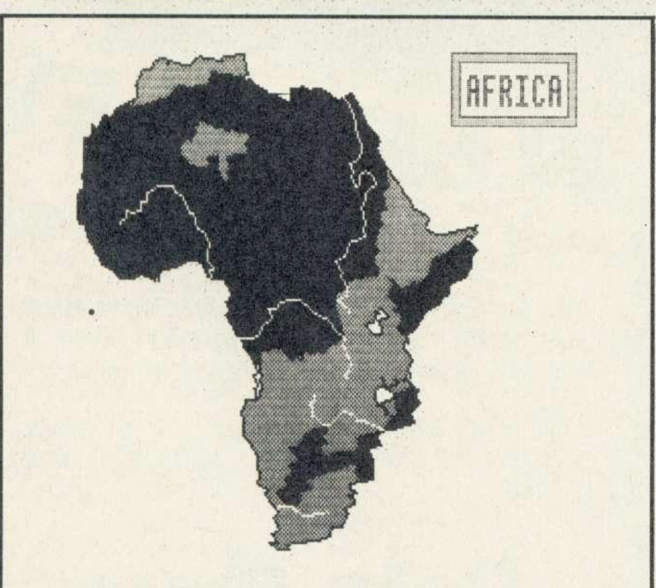
An overhead projector (OHP) is often used to support a prepared lecture or speech. Preparing such vufoils is a tedious and time-consuming task. *Easyplot* can make the preparation of computerised vufoils easy. The Vufoil Display program then displays the vufoils selected in the order required. It could be adapted for use with a cassette machine but for this application, where loading speed is vital, it's better to use disc.

Why use *Easyplot* for this job? First, if the subject of the lecture involves the use of the computer for demonstrations, having an overhead projector and screen placed so that everyone can see that screen as well as a computer screen is rather difficult in many situations. Second, by using *Easyplot* vufoils can be prepared at the expense of a single disc, so there's a considerable cost-saving in terms of stationery for OHPs. Third, *Easyplot* can produce neat and attractive vufoils, and mistakes are easy to correct. Fourth, the presen-





This lovely tapestry look-alike was produced using Easyplot. It is reproduced from last month's article, pages 80 and 81, where it was shown in colour



TAPE versus DISC

TAPE	Advantages	Robust Cheap to use
	Disadvantages	Slow Cumbersome to use A little unreliable
DISC	Advantages	Fast Easy to use Generally reliable
	Disadvantages	Expensive Not so robust

To show this demonstration sequence of 3 pictures with the Notice Board program enter the data statement DATA 1, BOAT, 0, MAP, 1, TEXT as shown in the text on page 139. You can enter your own frames and use the program to display information and illustrations in school classes and clubs. The data for the screens is on the October listings cassette and disc

tation can be much slicker and more professional, as no fumbling about with vufoils is required, nor do you need to fiddle with focusing of the OHP to obtain clear results. Last, having the vufoils on disc is much more convenient – a backup can quickly be made of the disc and there's no difficulty in finding the next vufoil, skipping vufoils, or going back to an earlier one.

Vufoil Display works only in mode 1. The screen text size allows 40 characters across the screen and, using the double-height facility, 14 lines of text can be displayed. This is sufficient for most applications. Use of the extended colour infill gives you plenty of textures and shadings to choose from. The print is clear enough to be read easily at a distance from the monitor – the actual viewing range depends on the size and quality of monitor in use and on the seating arrangement. It is wise to experiment in advance with monitors and seating to get the best results. In many cases the readability is higher than that of the conventional overhead projector.

Vufoil Display will display vufoils prepared using *Easyplot*. It allows the user to step through the predetermined sequence of vufoils at the press of a space bar. At the start of the program and between each vufoil the screen is blank. Pressing the space bar again will run the next vufoil. Thus the program simulates the action of an overhead projector, except that the space bar signals the placing or removal of a vufoil. With this system you can miss out vufoils from a pre-determined sequence – say, because time is short or you want to go back to an earlier one again to clarify a point.

Pressing the Escape key prompts a screen message asking which vufoil to present next. The program then continues through the sequence from that point to the end. When an earlier vufoil has been repeated the user can jump back to the original sequence by pressing the Escape key again.

A useful feature of vufoils is the ability to add overlays; this feature is present with *Easyplot* and can be used with Vufoil Display. The program differentiates overlays from new vufoils by means of the vufoil filename and presents them automatically as overlays.

The program displays the current vufoil in the bottom left-hand corner of the screen. If vufoil numbers are marked in the lecture notes to accompany the vufoils, the user can be sure that the correct vufoil is being displayed. This is important if the lecture was prepared some time ago and the contents of each vufoil cannot be remembered clearly. Using the *Easyplot* printer dump facility, a printout of each vufoil can also be made.

Using the program

The vufoils themselves need to be prepared using *Easyplot* in mode 1. This requires saving the files onto cassette first and then copying them onto disc. The use of the 6502 second processor is of great advantage here as it gives plenty of memory to work with (it is also faster).

The files need to be saved using filenames which consist simply of numbers, the first vufoil to be displayed being 1, the second 2 and so on. If the order of the files is incorrect this can be changed in the program, but it is useful to number them in order. Then you must put all the files together on one disc – normally two for the run program, and 29 for the vufoils themselves. You can overcome this limitation by inserting a second disc at the appropriate time, and indeed a message will appear at the bottom of the screen asking for a disc change should this be necessary. (The same message will also appear should a file not be found on the disc for any reason.)

Again, ensure that each vufoil is no longer than 2.5k (the use of overlays can overcome limitations here). Use the procedure mentioned earlier to check file-lengths.

When Display has been loaded in, the filenames need to be entered into the data statements at the end of the program. The last line must not be altered as this tells the computer that it has read all the data. To show a sequence of filenames in the order 1,2,3,4,2,5,6 the data statement should be written thus:

```
DATA 1,2,3,4,2,5,6
```

Extra lines are available for more data statements if needed. Notice again the absence of a comma at the end of the line. The program can then be saved to disc using the filename DISPLAY. As before, by entering the sequence of filenames into the data statements you can modify the sequence and call the same vufoil up in different places.

Finally, put an auto-boot on the disc as described above.

Using overlays

See the wipe command for details of how to produce overlays. If a particular vufoil (say vufoil 3) has three overlays, they should be filenamed 3A,3B,3C,3D. The 'base' vufoil will be 3A and the overlays 3B, 3C and 3D. The computer will add the next overlay when the space bar is pressed. It is not possible to remove overlays and replace them with alternatives. This can only be done by redrawing the base vufoil and adding the new overlay. If Escape is pressed to select a new vufoil you have to start at the base vufoil. Selecting, say, vufoil 3C will start the sequence off at 3A.

Tape use

Vufoil Display can be used with tape, and all the previous directions apply, except that it is not possible to auto-boot a tape, and it will not be possible to Escape and call up a previous vufoil. Care will have to be taken to ensure that there is enough time in the presentation for the tape file to load. The files start loading while the screen is blanked out.

'Easyplot can produce neat, attractive Vufoils and mistakes are easy to correct'

Producing Vufoils

1. Don't put too much information on the screen at once.
2. Select colours carefully to show up well against the background. Do not overdo the colours. If they are badly chosen you'll have to load the file back into the *Easyplot* program and re-define them.
3. Good effects can be made by drawing a rectangle, infilling it in the same colour, and then writing inside the rectangle in the background colour.
4. If possible all writing should be in double-height.
5. The extended colour infill can suffer from 'shimmer' when displayed on a television, but there should be no problems with a good-quality monitor.
6. Arrows can be formed using the < > symbols and the slashes \ and /.
7. Small circles can be formed using a small or capital O.
8. Thick lines can be made using slim rectangles that have been infilled.

Notice Board and Vufoil listings are on yellow pages 107-108

THE SHAPE OF THINGS TO COME

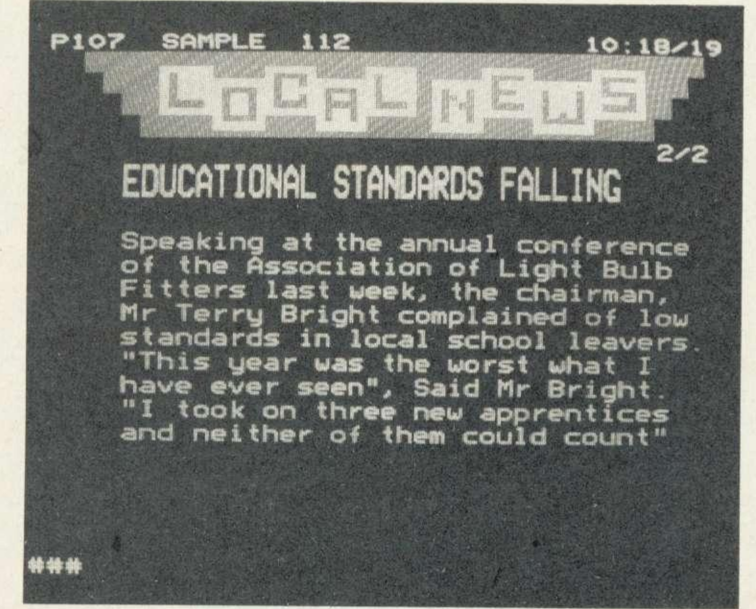
'The Information Age' is more than just Taddlecot revisited says Joe Telford of Acorn CES's package

BACK in April 1984 I was grieved by the changes to the education arm of Acorn Computers. Since then, times have changed again with the restructuring of Acorn after Olivetti's rescue. Education is now supported by two teams. One is made up of education advisers whose task is to provide a link between Acorn and Local Education Authorities.

The second group is the much reduced Acorn CES (Computer Education Services) team, set up about two years ago with six staff, and slowly pruned to the present three, to support curriculum development in schools. The first pack of material from Acorn CES in the 'Living with Computers' series, *Computers, Information and You* (reviewed in *Acorn User*, April '84) has been well received, with many counties buying software licences and schools purchasing class sets of books to assist in the teaching of IT awareness courses. Because of the success of this pack and the reduction in staffing at CES, I was concerned about the quality of the follow-up package.

The new pack, *The Information Age*, is made up of the pupils book, the teachers (or parents) guide, a set of activity sheets, a copy of program documentation (on tape) and three programs supporting the texts.

It could be used as a second module of 20 hours work, but as with the first pack it can be extended to fill whatever time a creative teacher can make available.



Viewer: part of the Teletext Emulator Suite (with Indexes and Creator), it simulates a teletext system from a consumer's standpoint. Every page can have up to five sub-pages

The student's book

This 120-page book follows the new CES design, finally severing connections with ICL (International Computers Limited). It covers the application of computers to the world in which we live, presented almost through the eyes of a child at school.

Chapter 1 considers the role of the home as an information centre. It examines ways information enters and leaves a home, then concentrates on Teletext, Viewdata and Cable TV.

This idea is extended in Chapter 2 to include the concept of leisure and labour saving devices, examining home video and micros in particular. It is representative of the underlying theme of the book: 'Look at the technology! We can do this now, and by the time you leave school it could be commonplace!'.

The next chapter considers the question 'What is money?'. I found this particularly interesting and relevant as a prelude to computers and money. The whole concept of money is developed to include promissory notes and cheques, and provides a valuable mini-module to make school-age children aware of why bank accounts are useful.

Chapter 5 gives you the punch-line, explaining the use of computers in, eg, banking, clearing houses and credit cards, as well as Electronic Funds Transfer. After reading this chapter I suspect most readers will look forward to the day of the rechargeable cash-card, with its attendent benefits. The cashless society, a complex concept even to adults, is well explained.

Chapter 7 changes theme, and looks at how news is reported and transmitted today. It explains the main ways in which a message can be moved. There is an historical perspective which examines the need for communication, and then considers faster and more efficient ways of doing so.

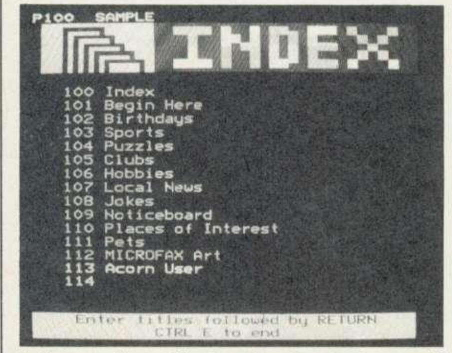
The effect of the computer and micro electronics on communication is shown in Chapter 9 where networks, electronic mail and facsimile machines are all considered, followed by an examination of the effect of telecommunications on society.

The theme of leisure is kicked off by considering how a cartoon movie is made, which is extremely interesting, and wouldn't be out of place in an art course. The effect of the home micro and computer games on leisure is examined, then how computer games for-

mats can be used to help learning is considered, followed by a look at the use of the computer in the arts.

The next theme is our working life – not only the electronic office and the application of computers in areas like data handling and wordprocessing, but also other aspects of microelectronics in work, and the reduction of labour intensive jobs, the future of work, and some of the alternatives.

Finally the question 'What next?' is posed, now that computers are beginning to recognise patterns, and to solve problems requiring logic. This leads



Indexer: allows the teacher to create or add an index to be used in Viewer and Creator

naturally on to artificial intelligence, and to expert systems. The last chapter considers our life when the current advances in microelectronics are just part of everyday events. The book concludes by asking what would happen if we suddenly found that there were no micro electronic devices? Would we be able to manage? I suspect that children will have less difficulty answering that question than adults.

All in all, though, the book is well written using language appropriate to 11 or 12-year-olds with a relaxed style, which is not above incorporating humour in its cartoon 'asides'. A multitude of grey panelled boxes in the text provide jumping off points for parents and teachers to digress or introduce more related material of their own.

The pace of the book is maintained by setting children frequent questions and problems which they need to discuss or perform as an activity. Although aimed at children, I can recommend the book as a preparation for adults having difficulty understanding the applications of computers.

The teacher's guide

This is an A4 handbook, written to the same standard as the pupil's text, with notes in two parts. The key concepts in each chapter are explained for the teacher's benefit, and answers are given to the problems set in the student's book. The second part of the guide explains how to run the computer programs associated with the pack.

The activity sheets

These are a collection of single-sided A4 sheets, which may be copied for class use, and which play two roles: first, they focus the student's attention on the task by asking questions; and second, they teach the student how to use the software in gradual, easy stages, so that he or she will eventually only use the sheets for reference.

The first sheet contains a set of overlays which should be copied and then cut out for future use. My criticism of such materials is that they make it easy for teachers not to have to think about preparing their own, but provided this is borne in mind they are very useful.

Documentation

The documentation is on tape or disc (on disc it can be loaded by pressing Shift-Break). After you follow its instructions, it prints a short form set of notes for the programs. The documentation is brief and only intended as a reference guide for those who have not bought the teacher's notes.


Movie: an animation package to generate a simple cartoon sequence by 'in-betweening'

The Program Package

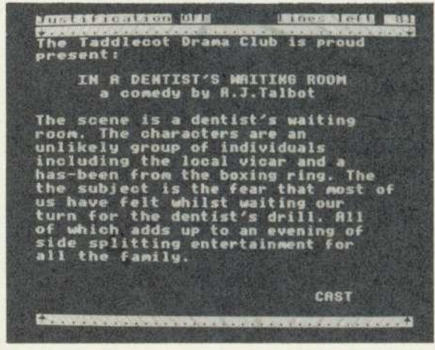
This consists of three programs relating to the pupil's text and which will run on the BBC range of computers. It's best to purchase the set which matches your machines most closely – there are versions for BBC B (Cassette), BBC BD (DFS), BBC BE (Level 1 Econet/Level 2/3 Econet) and BBC B+.

The software includes a teletext emulator, a movie animator and a wordprocessor. Each program – or in the case of the teletext emulator, set of programs – comes in two parts. A copyright logo announces ACORN-CES and sets up memory for the second program, which is the main working part of the application. All programs seem to be written in what I shall call CES-Basic – wonderfully compact Basic code, entirely undecipherable to all but the dedicated reader of listings. As even in this condensed form the program are around 10k in length, the original version must have been very large.

Unlike the simpler programs of '*Computers, Information and You*' these are undoubtedly powerful applications tools, which would stand in their own right without the text book (provided that CES could guarantee they would be properly used). I think that anyone contemplating using them would be best off buying a complete pack, just for the ideas which the books and sheets have.

The Teletext Emulator

This suite of three programs comes with a set of demonstration pages, and simulates the teletext systems operated by the BBC and the IBA.



Editext: a package to illustrate the fundamental concepts of a wordprocessor

The Viewer program simulates the teletext system from the consumer's standpoint. On entry, an index of available pages of information is displayed. The user can type a page number and that information will appear. Every page can have up to five sub-pages associated with it which are displayed sequentially for a maximum of 30 seconds each. Extra commands allow the current page to be held, passed or hidden information to be revealed.

Creator simulates the operation of a teletext system from the 'information provider's viewpoint, allowing pupils to create pages of teletext information in a simplified format. Although it has nowhere near the power of some of the larger teletext packages (eg, *Acorn User's* own Ecofax, *AU* January 1985), this package provides a valuable introduction to building teletext frames.

Simple instructions are given by the pupil to set background and foreground colours, text and graphics. It's possible to set up large text and flashing foregrounds, and to conceal information until the 'R' key is pressed in Viewer.

Indexer is used to create or add to the index available to Creator, for subsequent use by Viewer. It's mainly a tool for teacher's although some children may use it for project applications. Index creation is carried out in two stages. First, page titles are selected from a list of 15, each of which has a predesigned banner headline. Next, user-defined titles are added to the index, up to the system's maximum of

15 index entries. Banners of magenta characters on a blue background are used here.

Indexer also provides an option to collate information from several discs onto a single one for presentation.

The teletext emulator will run on cassette, but it is most effective on disc or econet, because of the time taken to load and save information.

The demonstration pages are well presented and aimed at children, although I had difficulty in believing that anyone would call a snake Cesil or worse still, a tortoise Wynford!

Movie

Movie is an extremely good, well thought out animation package, that enables pupils to create simple sequences of moving line graphics. This is achieved by defining individual frames in each sequence and then allowing the computer to generate the necessary movement of lines and points (known as in-betweening). As with the Teletext emulator, a number of pre-drawn animations exist which can be examined by pupils – most impressive was a cartoon where an Acorn icon changed into a BBC micro.

The program provides children with the options to load film, run film, change film values, edit film, save film, delete film and end.

These choices are self explanatory, but the option for editing the film relies heavily on the function key overlay strip provided. Effective cartooning requires an intimate knowledge of the overlay and the sub-menus it generates for moving, turning and scaling drawings, or selections of those drawings. I found this a little difficult to grasp without the activity sheets, but after a half-hour's practice I was able to animate the initials TT into a line-drawing of Telford Towers – turrets and all!



Creator: the third part of the Teletext Emulator suite allows pupils to devise simple teletext pages and is a valuable introduction to what an information provider does

Editext

This package illustrates the fundamental concepts of a wordprocessor. It's quite easy to use and can handle the needs of pupils just being introduced to wordprocessing. Because it is RAM-based and subject to BBC memory problems, it can only cope with a page of text in mode 3 or a few in mode 6. As it is a demonstration package, all actions affecting text are carried out on screen so that pupils can see how they work.

A series of sample texts is included and these form the basis for classroom activities involving text manipulation, which are skillfully designed to appeal to most children – certainly they generate a good deal of discussion and positive activity.

Editext is menu driven, but as with the other programs, the result of pressing the function keys must be understood before one becomes an expert at handling it.

Further features include cursor control, shifted cursor control, delete and insert character; block copy, move, delete and format; tabs, left and right margins, block markers, line centre, insert, delete, and justify.

All this in Basic and BBC RAM is quite amazing. Perhaps a 6502 version should be written to replace *View*? Seriously though, all the programs are expertly written and behaved properly during my destructive test routines, so they have a fair chance of success with pupils in lower secondary schools.

1. Load Text
2. Enter/Edit text
3. Print text
4. Save text
5. Delete text
6. Clear markers
7. Search and replace
8. Change screen mode
9. End

Figure 1. Main menu for Editext

Conclusions

I expected this pack to be a 'Return of the vengeance of the problem-solvers of Taddlecot' (the fictional town in *Computers, Information and You*), and as such I would have accepted that it simply had a place in our classrooms. Instead, the links with Taddlecot are maintained, but the actual learning from this package can be from the pupil outward.

The idea of learning skills and concepts rather than just memorising facts is one of the mainstays of primary education, and teachers should welcome the extension of these ideas into cross-curricular IT courses in secondary schools.

The applications software gives children a chance to experience real-life activities that are based around computing. Certainly if there is to be a third pack in the 'Living with Computers' series, then this is the route the CES team should follow.

In the next few months I would expect to see *The Information Age* as a companion or extension course to *Computers, Information and You* in secondary schools.

Availability and prices

The Information Age is the second in the 'Living with Computers' series. It is available from Acorn CES, c/o Vector Marketing, London Road, Wellingborough, Northants NN8 2RL. Enquiries to Acorn CES, c/o Acornsoft on (0223) 214411.

Some Education authorities are purchasing a software licence for all the schools in their area, so if you are a teacher you should check with your LEA Computing Adviser.

Prices

Pupil's book	£2.95 (schools')
	£3.95 (other)
Teacher's notes and activity sheets	£9.50 (schools')
	£12.50 (other)
Institutional licence, allowing a named educational establishment to make copies of the software for its own use	£30

INTER-SHEET

The electronic spreadsheet program

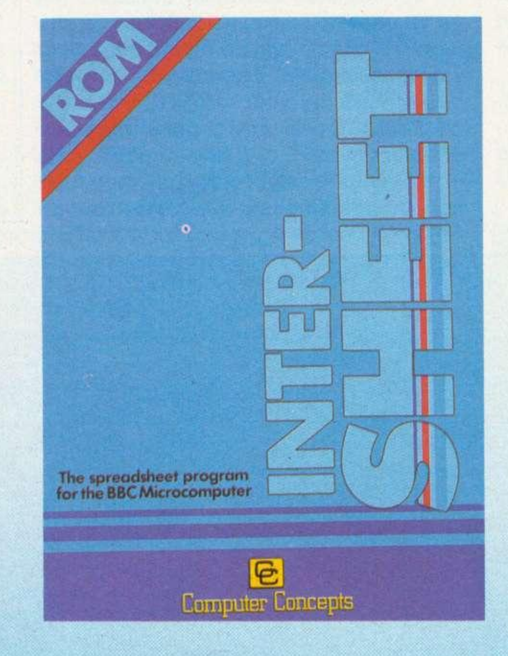
Spreadsheet programs have become powerful and very popular applications for micro-computers, second only to word processors. They can be regarded as a totally general purpose tool.

INTER-SHEET supports a full range of high precision mathematical functions, and a variety of special sheet functions, such as SUM, MAX, MIN, LOOKUP, AVERAGE etc.

Numbers may be printed in three different formats, and with up to nine decimal places. Labels may be left, centre or right justified. All the box formats are alterable on a box by box basis.

INTER-SHEET is supplied on two ROMs. If there is only one socket spare, then it is still possible to access most of the features of INTER-SHEET. The facilities lost are mostly to do with the ROM-LINK integration and multiple spreadsheets.

The INTER-SHEET ROMs are not designed to work with the 2nd processor. However a HI-INTER- SHEET is available on disc that allows 42K of storage on the 2nd 6502 processor. This program requires that one INTER-SHEET ROM is present in the BBC micro, and is supplied at £4.95.



From the same stable as WORDWISE, INTER-SHEET is the first of a new generation of programs, and provides the most powerful and flexible spreadsheet on the market for this machine. This package has many quite unique features–

1. Up to 16 spreadsheets in memory at the same time.
2. Data from one spreadsheet can be used directly by others.
3. Compact, tokenised data storage means that larger than normal spreadsheets can be supported.
4. 40, 80 or 105 column screen modes. The special 105 column mode allows a far greater proportion of the spreadsheet to be seen on screen.
5. Fast re-calculation and replication times (see table).
6. Complete documentation—an introduction manual, reference manual and quick reference card.
7. Data can be transfered to and from popular word-processors like WORDWISE and VIEW.
8. Extensive built-in help menus.
9. Will integrate directly with INTER-CHART and other ROM-LINK compatible products.
10. Simple to use self prompting commands.

The above points are unique to INTER-SHEET. The last unique feature is the price, lower than any other ROM based spreadsheet.

£49.00+VAT (£56.35)

Spreadsheet comparisons

Times in seconds	VIEW-SHEET	ULTRA-CALC 2	INTER-SHEET
Replicate SIN(PI) into boxes A1 to Z50	66	65	7
Recalculate the above	28	33	5
Number of bytes free with above sheet	4664	1415	8400
Price (Exclusive of VAT)	£52.00	£69.13	£49.00

INTER-SHEET
SHEET

ROM-LINK

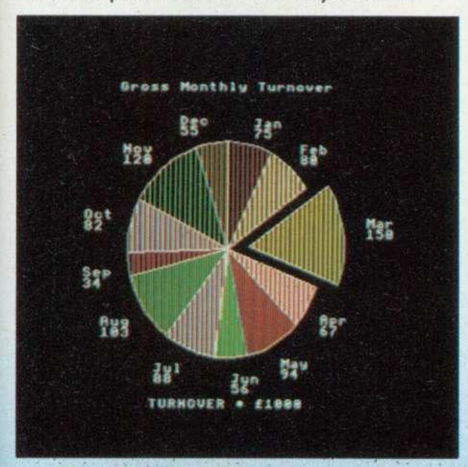
The ROM-LINK concept provides a system that allows true integration on the BBC machine. The system takes full advantage of the BBC micro's ability to switch between ROMs and allows direct communication between a variety of different programs. Any ROM-LINK compatible program will integrate directly with any other ROM-LINK program. INTER-SHEET and INTER-CHART are the first in a planned range of ROM-LINK compatible application packages.

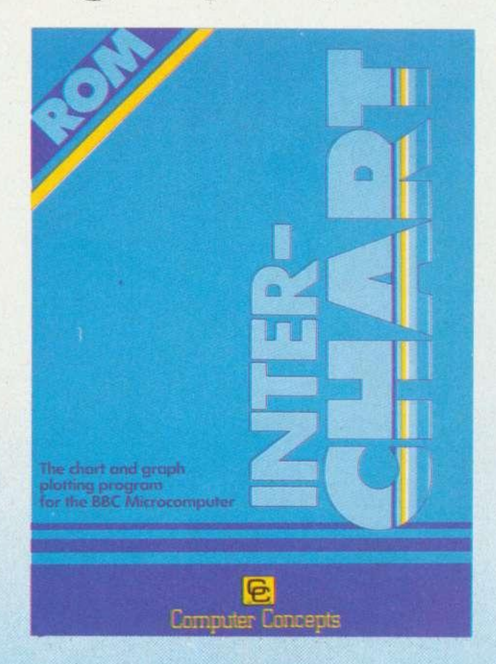
ROM-LINK has two great advantages. Firstly it allows multiple packages (up to 16) to occupy the machine at the same time, so when switching from one task to another there is

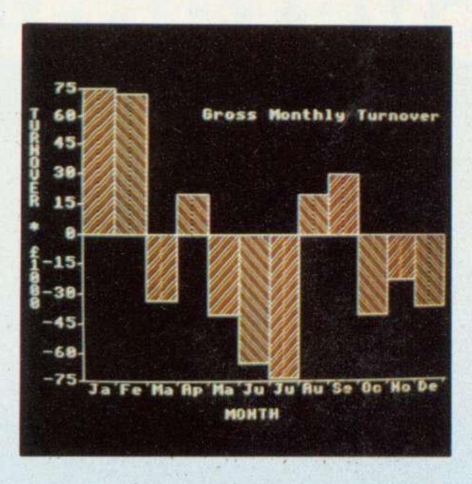
INTER-CHART

The chart and graph plotting program

The perfect partner for INTER-SHEET, allowing data to be displayed in a variety of graph formats. Strings of numbers are usually difficult to digest, and it is almost impossible to find any trends in data when displayed numerically. However when displayed graphically even the most complex data can be easily studied.







INTER-CHART has screen dump facilities for EPSON compatible printers although other printers can be catered for.

Supplied with a full manual and fitting instructions.

INTER-CHART can accept data from three quite distinct sources. Firstly, directly from other ROM-LINK packages such as INTER-SHEET. Data can be obtained directly from any box, row, column or area of the spreadsheet.

Secondly, data can be entered at the keyboard. At the simplest level the user can type in a series of numbers, and a graph will be plotted from that data.

Thirdly, data can be read from ASCII files on disc or tape. This enables data to be used from other languages or programs or from practically any source that can store the data onto file in the first place.

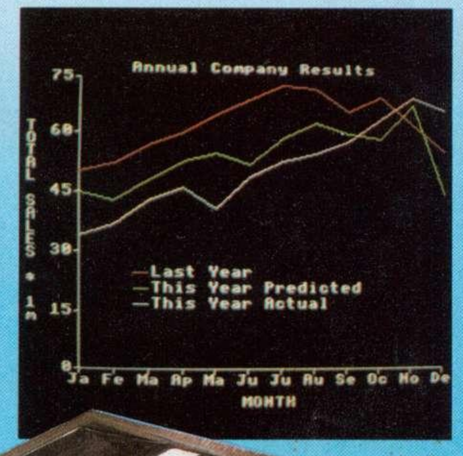
£32.00+VAT (£36.80)

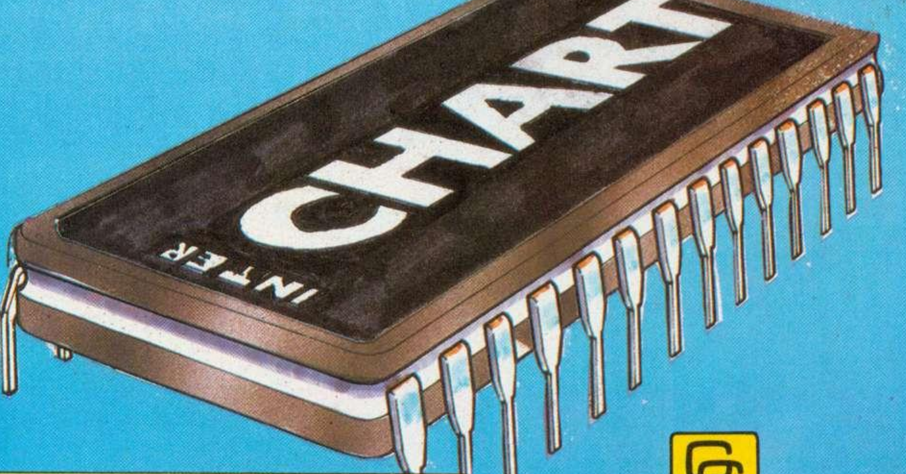
Available from all good software dealers or directly from ourselves at the address below.



INTER-CHART supports three main types of graph. The pie chart, the line graph and the bar chart. In the pie and bar chart any particular element of data can be highlighted.

Up to 16 separate sets of data (graphs) can be held in INTER-CHART, but because this product is ROM-LINK compatible up to 16 separate INTER-CHARTs can be on the go at once. Many graphs can be overlayed on top of each other (not pie charts) so comparisons can be made between separate sets of data.

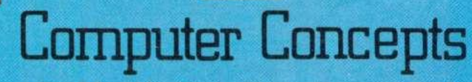




o need to save the data before entering the next package. Secondly it provides a means of directly transferring data from program to program.

he system works even if only one ROM-LINK package is present in the machine, for example INTER-SHEET. In this case up to 16 separate spreadsheets may be held in memory and any spreadsheet can use the data from any other.

he ROM-LINK concept will provide a degree of integration not found on any other system.



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★ Available with digitising input device and comprehensive CAD/Graphics software.

★ Available as software only
- ★ for direct keyboard input
- ★ for input with GRAFPAD
- ★ for input with RH Lightpen

★ Hard copy can be obtained using resident printer and selected plotter dumps. Visuals may also be freely incorporated into own programs.

★ 'Decode' software available enabling user to list X and Y co-ordinates, measure area of enclosed shapes and length of lines. The X and Y co-ordinates may be used to drive numerically controlled machinery and robots.

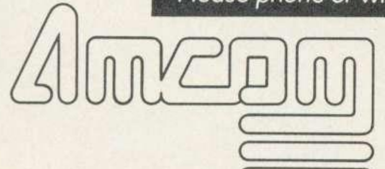
★ Network compatible software available.

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B. S. Dollamore Limited
Burton Road, Castle Gresley
Burton upon Trent, Staffordshire DE11 9HA
Tel: (0283) 217905

ENET-THE BBC HARD DISC NETWORK

- **Reliability and security tried and tested with hundreds of users for over two years**
- **Easy to use — ICON driven fileserver**
- **Acorn Z80/6502/Bitstik compatible**
- **Easily expandable from 10 to 650 megabytes**
- **Superb educational features**
- **Tapestreamer back-up**
- **User Group for help and hints**

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Amcom Software Limited
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Kiln Farm, Milton Keynes MK11 3ET
Tel: (0908) 569212

CLARES No1 IN UTILITY SOFTWARE!

Enhanced BETA-BASE £25

40 80 3"

WHAT IS A DATABASE?
It is a FILE containing RECORDS, each record consists of a number of FIELDS containing the information—an analogy can be drawn with a card index in which a box of cards is the file, each card is a record and each line on the card is a field.

SPECIFICATION

1) Random Access	— disc based, single or dual drives.
2) File Sizes	— max 65,000 records.
3) Record Size	— up to a 2048 characters and 200 fields.
4) Field Size	— up to 254 characters.
5) Holds	— approx 1200 ADDRESS records per 100k.
6) Search	— 5 search fields using powerful options.
7) Sort	— 500 records on 3 fields in 60 seconds.

SYSTEM FEATURES

★ CALCULATE—using any valid expression and store results.
★ POWERFUL PRINTOUT OPTION—eliminates need for separate mailing program, parallel/Serial Printout allows setting of printer control codes, line spacing, tabulation, Headings etc., plus label printing with horizontal and vertical tab control.
★ REDEFINE—Titles, field widths, number of fields, number of records etc.
★ TRANSFER—Records from one file to another.
★ SEARCH LISTS—Allow creation of sub Databases within main Database.
★ GLOBAL ENTRY—provides easy entry of repetitive data and a powerful global edit/update facility that will save hours of typing.
★ SPOOLER—enables you to create spooled files that are compatible with Wordwise, View and other word processors. The spooler program will allow you to format your spooled file in the same way as the powerful printout option. You can therefore have headings, columns, titles, numbers etc.
★ INPUT—is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the coming utilities disc were written using this procedure.
★ TUBE—compatible with the 6502 second processor.
★ Comprehensive manual and tutorial.

Beta-Base Utilities disc containing many advanced features such as full disc sort, AND/OR search on 10 fields, wildcards, mail merge + many other features.

Available Now £12

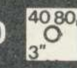
"Beta-Base is a joy to use"
BEEBUG March 85

"Excellent value for money"
A & B Computing OCT 84

"rated best value for money"
ACORN USER Dec 84



REPLICA II £12.00



In addition to working with the standard single density DFS's REPLICA II is now compatible with the following double density DFS: OPUS 3.45, UDM v. 2.00 and CUMANA QFS.

The original REPLICA set a very high standard so the specification that we set our chief programmer presented him with a real challenge. In fact REPLICA II is now 2 separate programs, one for DFS using the 8271 controller and the other for the various DDFS that fully implement OSWORD &7F. REPLICA II will transfer many of your cassette based programs to disc, even more than REPLICA did. Now when you buy disc drives you do not have to throw away your expensive cassette based programs.

REPLICA II transfers 'LOCKED' programs, programs loading as files, programs that load below &EOO, those with up to 9 sections and those up to &6E in length e.g. adventure programs. No more waiting for 6 minutes whilst your adventure programs load.

REPLICA II is very easy to use and the user just enters a name, how many sections and whether CHAIN, *RUN or *LOAD is used to load the first section. Press play and let the program do the rest, even a menu. Just think how much it will cost you to buy a disc version of your favourite program—it is probably more than REPLICA II, which will hold up to 16 programs, limited only by the disc capacity and catalogue.

STATE DFS & 40 or 80 tracks

New! PROFILE £12.00

40 80 3"

A PROCEDURE LIBRARY MANAGEMENT SYSTEM

Now you can start the procedure library that you always promised yourself. PROFILE allows you to store, list, merge and grab procedures without any of the headaches. Automatic alteration of LINE NUMBERS and resident variables such as TOP, LOMEM etc release you from the tedious chore of setting and resetting, checking and rechecking. PROFILE leaves you free to create your programs without disturbing your chain of thoughts.

★ 100 Procedures can be stored on each disc (disc space allowing)
★ NO LIMIT to the number of procedure discs used
★ MERGE Procedures into your programs easily
★ LIST Procedures from disc to check suitability etc
★ RENAME Procedures on disc
★ GRAB new Procedures from existing programs
★ NESTED Procedures can also be grabbed automatically

A Procedure can be a FUNCTION, a BASIC program or part of it or a PROCEDURE.

With PROFILE you will quickly amass a wealth of procedures which will enable you to write programs quickly and easily. Simply write the controlling program containing the procedure calls and PROFILE will merge the procedures for you.

PROFILE in effect provides you with a MACRO BASIC in which you only have to define the procedure once and it can be re-used automatically thereafter.

Make life easier for yourself and order PROFILE today.

DEPT AU
98 Middlewich Rd.,
Northwich, Cheshire CW9 7DA.
Tel: 0606 48511
Open 9—5pm Monday—Friday
LUNCH 12.30—1.30

New! BETA-ACCOUNTS INVOICE & DELIVERY NOTE MODULE £25.00

40 80 3"

This is the first module in an integrated accounting suite of programs written to be used and not simply to please an accountant. This module contains an INVOICE and DELIVERY NOTE program with 80 column input and screen editing, you see what will be printed before committing yourself. Account customer details are inserted automatically and delivery notes generated automatically when required. Customer details without account numbers can be automatically placed in a Beta-Base compatible file for use as a mailing list.

A sales ledger sheet is printed automatically when there is enough data to fill a page, alternatively the user can print the ledger sheet before a full page to suit his needs. VAT details are generated at the end of the VAT period and the year to date figures can be viewed at any time. Provision is made for multiple VAT rates including standard, zero, export and exempt.

A transaction file is generated for account customers for use with the STATEMENTS and ACCOUNTS RECEIVABLE module.

Future modules will be STATEMENT and ACCOUNTS RECEIVABLE, STOCK CONTROL, ACCOUNTS PAYABLE and NOMINAL LEDGER. All relative files are compatible with CLARES Beta-Base which can be used to manipulate the files as required. A Beta-Base Utilities Disc will soon be available and will provide Mail-Merge facilities and links into ULTRACALC plus many other features.

★ INTEGRATED ACCOUNTS and DATABASE
★ MULTIPLE VAT rates
★ SCREEN EDITING with insert & overwrite
★ AUTOMATIC DELIVERY NOTES
★ INVOICE COMMENTS
★ ACCOUNT HOLDERS details inserted automatically
★ MAILING LIST generated automatically
★ LEDGER SHEET printed automatically
★ VAT sales returns prepared
★ TRANSACTION FILE generated
★ Beta-Base compatible

This program was written for our own use and is used to prepare hundreds of invoices per week. It has no unnecessary questions or keys to press and extensive but easy edit options, we have made life as easy as possible for ourselves so why not take advantage of our efforts.

Requires double sided single or twin single sided drives for minimum configuration –no stock control or customer database. Double sided twin drives will enable a full integrated system to be used.

FUN HOUSE £10.00



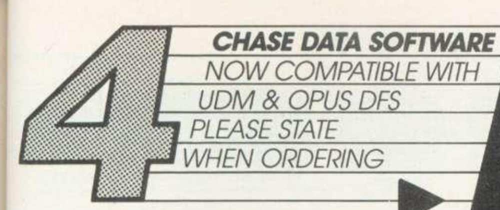
FUN HOUSE is a highly original suite of educational programs suitable for ages 3 to 13. The program is designed to encourage children to spell words which relate to objects found around the home. Animation and music are used to good effect and some highly original ideas are incorporated. Each room exercise is terminated with a warning item e.g. the lounge finishes with 'FIRE' which goes on to engulf the whole lounge. Tests with a newly hired 4 year old resulted in us having to prise him away from the keyboard after 2 hours. In that time he had gone from never having used a keyboard to finding the location of all the keys very quickly and entering the correct answer. He had thus started on the path to learning spelling and familiarised himself with the keyboard including the use of DELETE to correct his mistakes. Can you afford not to give your children the same start?

Send for detailed newsletter.
All prices inclusive of VAT & Carriage—
NO EXTRAS! Please state 40 or 80 track disc and state which D.F.S. you use

Today's Technology at Yesterday's Prices from Chase Data.



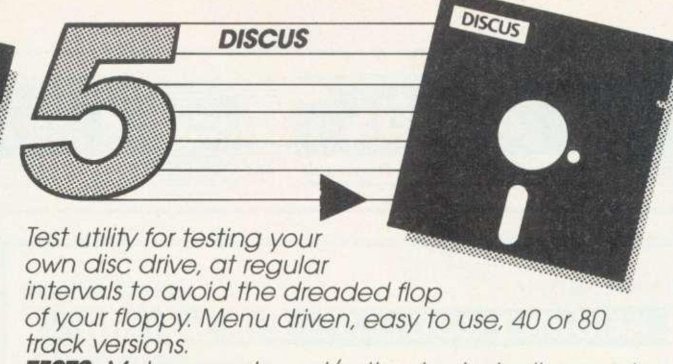
CHASE DATA LTD THE DISC DRIVE COMPANY WITH DIRECT PURCHASE FROM JAPAN AND A PROFESSIONAL AFTER SALES SERVICE.



VECTOR 1 The ultimate tape to disc utility. Vector 1allows you to transfer almost all your tape software to disc. Unlike others, you only need to buy 1 copy of Vector 1 since it transfers tapes to specially formatted program discs. This is easily the most powerful tape to disc utility available.

Vector 2 New 1.2 VER. Disc to disc utility. Vector 2 allows you to make backup copies of all your valuable disc software. It is the most advanced utility of its kind available. It is a condition of sale that neither of these products are used for infringement of copyright.

Vector 1 **£16** On its own
£15 If purchased with disc drive
Vector 2 **£16** On its own
£15 If purchased with disc drive
Vector 1 & 2 **£30**



Test utility for testing your own disc drive, at regular intervals to avoid the dreaded flop of your floppy. Menu driven, easy to use, 40 or 80 track versions.

TESTS: Motor speed, read/write, steptest, alignment test,* step and read/write test, read only test.
£8.00 inc. **£7.00** if purchased with disc drive.
*This test requires an oscilloscope and alignment disc.

EPROMS
QUALITY EPROMS BY 'HITACHI'

2764-250 NS	**£3.00**
27128-250 NS	**£5.00**

INCLUSIVE OF P&P & VAT

DIAGRAM
A PROGRAM WHICH ALLOWS YOU TO STORE VERY LARGE DIAGRAMS — UP TO 39 MODE 0 SCREENS — AND VIEW OR EDIT THEM BY SCROLLING THE COMPUTER SCREEN AROUND OVER ANY PART OF THE DIAGRAM

FEATURES
- Draw diagrams, schematics, plans etc., in any aspect ratio, e.g. 10*3, 2*12 screens.
- Access any part of the diagram rapidly by entering an index name, e.g. TR6, R5 etc., to display a specific section of the diagram, and then scroll around to any other part of the diagram using the cursor keys.
- Up to 128 Icons may be predefined for each diagram, e.g. Transistors, resistors etc., in full mode 0 definition, up to 32 pixels horizontally by 24 vertically.
- Hard copy printouts in varying print sizes up to 9 mode 0 screens on an A4 size sheet, compatible with most dot matrix printers.
- Many other features including, selectable display colours, comprehensive line drawing facilities, TAB settings, etc.
- Disc contains sample diagrams and two versions of the program, one of which will work from a 16K sideways RAM.
- Comprehensive instruction manual.

£28.75 **Including P&P & VAT** Supplied only on disc 40T/80T compatible.

DON'T FORGET YOUR VECTOR 1 & 2 WHEN ORDERING.

All inclusive price list: This means: disc drive + case + all power & data cables + UK carriage + utilities disc & manual + VAT.

Model	**CANON 210**	**220**	**221A**	**596D SANYO**
Formatted Capacity per drive on BBC Micro:	**200K**	**400K**	**400K**	**400K**
Single Drive & Case:	**£75**	**£119**	**£125**	**£149**
Single Drive & Case/PSU: *u/c = UPGRADEABLE	—	**£144**	**£173*u/c**	**£174**
Dual Drive & Case	—	**£229**	—	**£279**
Dual Drive & Case/PSU:	**£185**	**£244**	**£279**	**£309**

FUJI FLOPPY DISCS

	Per box 10	If purchased with disc drive
40 TK SS DD	**£17.60**	**£15.60**
40 TK DS DD	**£24.50**	**£22.50**
80 TK DS DD	**£28.60**	**£26.60**

These prices include VAT & P&P.

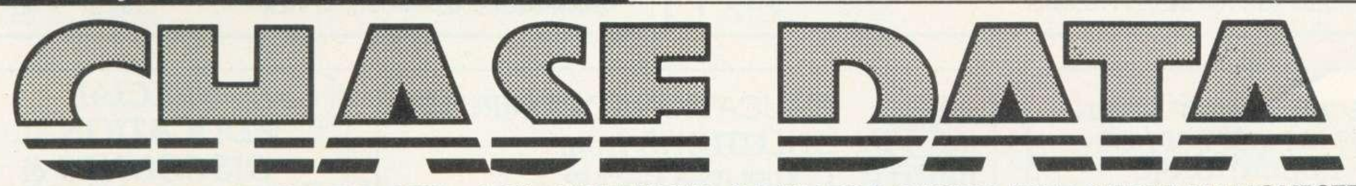
Support:
Warranty: All disc drives sold by Chase Data Ltd come with a full one-year warranty on parts & labour with optional extended warranty on all drives.

Extended Warranty
Your Insurance of trouble free operation.
When ordering your disc drive, ask about our second and third year extended warranty scheme. This covers ALL PARTS AND LABOUR and costs from as little as £15.00 on single drives and £23.00 on dual drives.

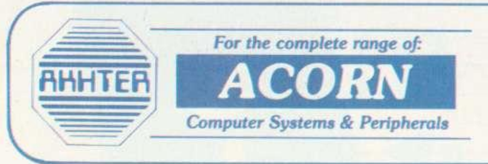
Payment:
By Post:



Send your remittance (cheques only please) with your order to: Chase Data Limited, Unit 2, Crabtree Road, Thorpe Industrial Estate, Egham, Surrey TW20 8RN.
By Phone: **(Tel: 0784-38487).** Allow up to 21 days for delivery.



SEE US ON STAND 47 ON THE 27th - 29th SEPTEMBER AT THE BBC MICRO USER SHOW MANCHESTER.





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DISK DRIVES



For the complete range of:

TORCH

Computer Systems & Peripherals

ACORN PRODUCTS

	AKHTER PRICES Ex. VAT £	Inc. VAT £
BBC Model B+.	409	469
BBC Model B (including £50 of software).	299	344
BBC Model B with Disk Interface.	373	429
BBC Model B with Econet Interface.	349	401
BBC Model B with Disk & Econet Interfaces.	399	459
6502 Second Processor.	173	199
Z80 Second Processor.	346	399
Winchester Disk Drive - 10 Mbytes.	1304	1499
Winchester Disk Drive - 30 Mbytes.	1999	2299
BBC Prestel Receiver.	121	139
BBC Teletext Receiver.	196	225
Model A to B Upgrade (incl. fitting).	90	103
Econet Interface (incl. fitting).	60	69
Disk Interface (incl. fitting).	103	118
IEE Interface.	284	327
Intelligent Printer Buffer/Sharer.	245	282
Speech Upgrade.	48	55
EPROMER for the BBC (with Software available on Cassette, Disk or ROM - Please specify).	99	114
Acorn Bitstick.	328	377
Acorn Bitstick, Multi-plotter Driver.	69	79
AMX Mouse.	75	87
Traker Ball.	52	60
Grafpad.	120	138
Games Paddles.	13	15
BBC SOFTWARE		
Iso-Pascal.	50	58
Wordwise.	35	41
Wordwise Plus.	49	56
View.	52	58
Viewsheet.	52	58



TORCH COMPUTERS

	Ex. VAT £	Inc. VAT £
Torch Z80 Disk Pack.	564	649
Torch Z80 Card Only.	266	306
Torch ZEP 100 Second Processor.	299	344

AKHTER DISK DRIVES

100% BBC COMPATIBLE, HIGH QUALITY, HALF-HEIGHT FLOPPY DISK DRIVES.

The widest range of AKHTER disk drives at prices that will drive you crazy!

Housed in either robust plastic, or strong metal cases. Supplied complete with all necessary cables, formatting disk with various utilities, and a comprehensive User's Guide.

	AKHTER PRICES Ex. VAT £	Inc. VAT £
5¼" DISK DRIVES with 2 Years Warranty		
Single Drive (housed in a robust plastic case)		
MD400A Double-sided 400k, 40/80 track switchable.	109	125
MD200A Single-sided 200k, 40 track.	95	109
MD100A Single-sided 100k, 40 track.	86	99
Single Drive (housed in a strong metal case, with PSU)		
MD400B Double-sided 400k, 40/80 track switchable.	129	149
MD200B Single-sided 200k, 40 track.	119	137
Dual Drive, Vertically Stacked (housed in a robust plastic case)		
MD802C Double-sided 800k (2 x 400k), 40/80 track switchable.	208	239
MD402C Double-sided 400k (2 x 200k), 40/80 track switchable.	190	219
Dual Drive, Horizontally Mounted (housed in a strong Monitor Stand metal case, with PSU)		
MD802D Double-sided 800k (2 x 400k), 40/80 track switchable.	286	329
MD402D Double-sided 400k (2 x 200k), 40/80 track switchable.	260	299
Dual Drive, Vertically Stacked (housed in a strong metal case, with PSU)		
MD802E Double-sided 800k (2 x 400k), 40/80 track switchable.	274	315
MD402E Double-sided 400k (2 x 200k), 40/80 track switchable.	248	285
5¼" DISK DRIVES with 1 Year Warranty		
Single Drive (housed in a strong metal case)		
SD400A Double-sided 400k, 40/80 track switchable.	86	99
Single Drive (housed in a strong metal case, with PSU)		
SD400B Double-sided 400k, 40/80 track switchable.	105	120
Dual Drive, Vertically Stacked (housed in a strong metal case)		
SD802E Double-sided 800k (2 x 400k), 40/80 track switchable.	192	220
3½" DISK DRIVES with 1 Year Warranty		
Single Drive, house in a vertically stacked strong metal case, fully equipped with cables for later expansion to dual drives, and comes with blanking plate fitted over the second drive position.		
MD400F Double-sided, 400k (single-density), 800k (double-density), 40/80 track switchable.	99	114
Dual Drive, housed in a vertically stacked strong metal case fully equipped.		
MD802F Double-sided, 800k (single-density), 1.6 Mb (double-density), 40/80 track switchable.	173	199
3M 5¼" DISKETTES		
Single-sided, double-density, 40 track	16	18
Double-sided, double-density, 40 track.	23	26
Double-sided, double-density, 80 track.	27	30
3M 3½" DISKETTES		
Single-sided, double-density, 40 track.	28	33
Double-sided, double-density, 40 track.	39	45

SPECIAL ADVICE GIVEN ON ALL ASPECTS OF EDUCATIONAL SOFTWARE & HARDWARE PRODUCTS



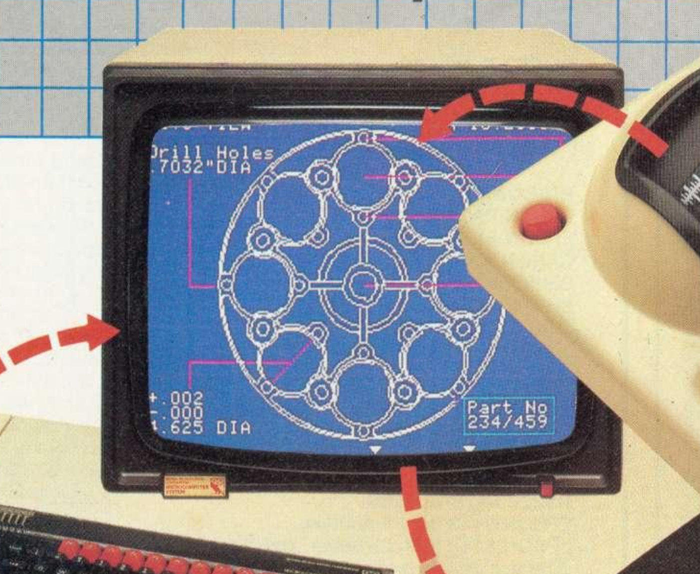
EDUCATIONAL COMPUTER SOLUTIONS from COMPUTER GROUP

SPECIAL EDUCATIONAL DISCOUNTS & BULK ENQUIRIES WELCOME.

PROFESSIONAL · CAD · FOR · PROFESSIONAL · RESULTS

New Robo Bitstik 2 tunes in to the BBC...

At last a full Computer Aided Drafting System for your BBC Model B Micro.



Introducing Bitstik 2, the first system to bring sophisticated CAD techniques to the desk of the BBC Model B user.

Bitstik 2 is the affordable solution to your technical drafting problems. Designed to take full advantage of your BBC's powerful graphics facility, the system is easy to learn and fast to operate.

Bitstik 2 incorporates a range of impressive functions, clearly displayed on-screen as Menus and Palettes. These are selected via the Bitstik hand controller, which also controls the dynamic 'rubber-banded' drawing cursors.

Among the system's impressive list of capabilities are:

- Auto Dimensioning
- Adjustable Curves
- Precision Grids & Angle Locks
- Powerful Zoom And Pan
- Scale Drawing & Text
- Graphic Library Index

These advanced features represent a significant step forward from the existing and very successful Bitstik Graphics System. Yet Bitstik 1 users can obtain Bitstik 2 at a Special Upgrade Price.

Bitstik 2 is produced in the UK by Robocom, the people behind the best-selling Robosystem family of CAD packages for the Apple II (+ or e) micro. To run Bitstik 2 you will need a BBC Model B with 6502 Secondary Processor, Twin Disk Drives and colour or monochrome monitor. Quality hard copy can be produced from a wide range of supported plotters.

TM

So whether you need to produce complex architectural plans, detailed circuit diagrams or simply teach CAD on a fully implemented CAD set-up (with scope for advanced project work) you ought to be tuning into Bitstik 2 for your BBC...

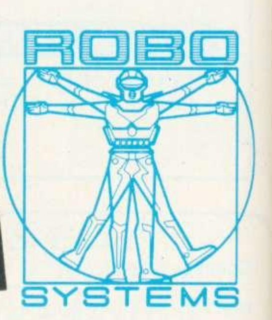
Hotline Support

What's more, with Robo, advice doesn't stop when you've purchased a system. A small yearly subscription ensures that lifting your phone puts you in touch with expert help on any drawing or technical problem.

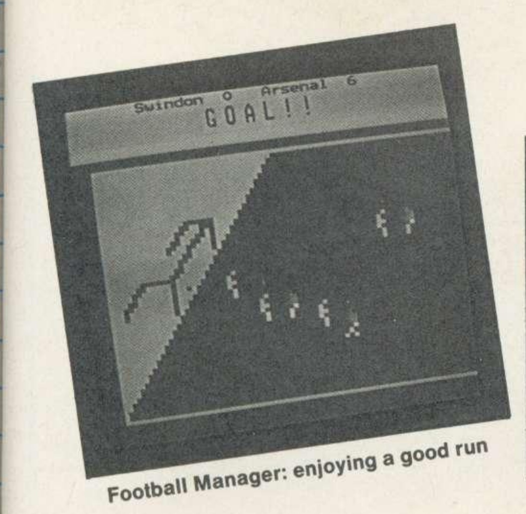
Test draw a Bitstik

See for yourself how the Bitstik 2 system can make your drafting projects easier. Just try it out, with no obligation to buy. Ask your local Robocad Centre for details of our free Test Draw a Bitstik Offer.

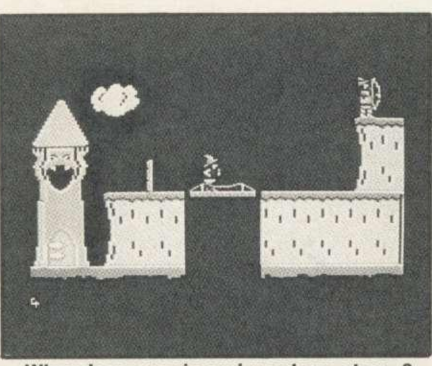
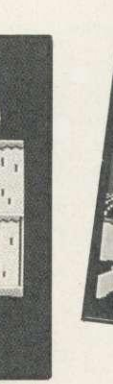
DIAL 100 AND ASK THE OPERATOR FOR FREEPHONE ROBO. WE'LL PUT YOU DIRECTLY IN TOUCH WITH YOUR LOCAL ROBOCAD CENTRE.

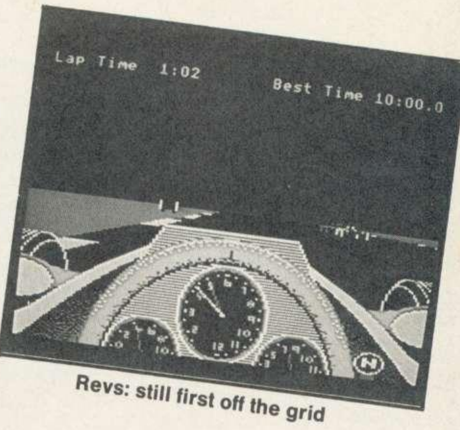


Robocom. Clifton House, Clifton Terrace, London N4 3TB.
Telephone 01-263 8585/272 8417. Telex 297137 ROBO G



Football Manager: enjoying a good run



Wizardore: magic and mayhem at no. 8

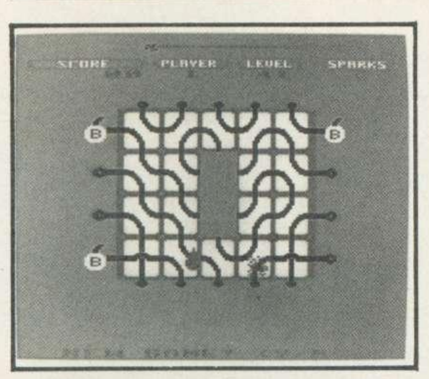


Revs: still first off the grid

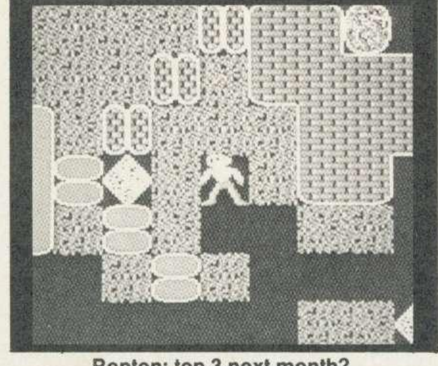
GAMES TOP 20

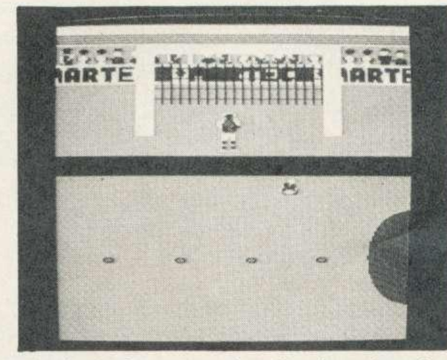
	TITLE	PUBLISHER	PRICE	MICRO	REVIEWED
1 (1)	Revs	Acornsoft	£14.95 (£17.95)	B	July '85
2 (3)	Alien 8	Ultimate	£9.95	B	
3 (4)	Atic Atac	Ultimate	£7.95	B	
4 (11)	Repton	Superior	£9.95 (£11.95)	B/E	September '85
5 (2)	Knightlore	Ultimate	£9.95	B	
6 (5)	Elite	Acornsoft	£14.95 (£17.95)	B/E	October '84
7 (9)	Magic Mushrooms	Acornsoft	£12.95 (£14.95)	B/E	May '85
8 (7)	Wizardore	Imagine	£7.95	B	August '85
9 (-)	Confuzion	Incentive	£8.95	B/E	October '85
10 (-)	Lode Runner	Software Projects	£7.95	B	
11 (6)	Combat Lynx	Durrell	£8.95	B/E	September '85
12 (17)	Castle Quest	Micro Power	£12.95 (£14.95)	B	March '85
13 (-)	Manic Miner	Software Projects	£7.95	B	
14 (8)	Brian Jacks Superstar	Durrell	£7.95	B/E	August '85
15 (10)	Football Manager	Addictive	£7.95	B/E	March '85
16 (-)	Birdie Barrage	CDS	£7.95	B/E	December '84
17 (13)	Pole Position	Atarisoft	£9.99	B	February '85
18 (12)	Gremlins	Adventure International	£7.95	B/E	
19 (14)	Hunchback	Ocean	£6.90	B/E	December '84
20 (re)	Hobbit	Melbourne House	£14.95 (£17.95)	B/E	

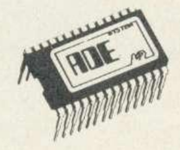
B = BBC. E = Electron. re = Re-entry. Prices in brackets are for disc versions. Compiled by RAM/Computer.



Confuzion: reviewed on page 165


Repton: top 3 next month?


Brian Jacks Superstar: heading for relegation?



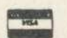
No. 1 . . . . . .

Macro Assembler ● Debugger ● Editor

The industry standard assembly program development tool for the BBC microcomputer, fully 2nd processor compatible.

Version 2 has been significantly enhanced to include local labels, more than one output file, enhanced arithmetic expressions. With a second processor there is an 80 column version of the powerful ADE macro EDITOR and the option to assemble to memory for a really fast assembly.

£60 incl. vat. 40 or 80T utility disc, please specify.

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Tesselator

times two

'Tesselator', £21.95 (disc £27.97), Addison-Wesley, Finchampstead Road, Wokingham, Berkshire RG11 2NZ. Tel: (0734) 794000
'Tesselations', £21 plus VAT (disc), Cambridge University Press, The Pitt Building, Trumpington Street, Cambridge CB2 1RP

THE graphic work of the Dutch artist M C Escher has generated increasing interest since his death in 1972 because of its remarkable use of interlocking designs produced as lino cuts or lithographs. It is perhaps ironic that both the packages under review make use of some of his original work to illustrate their subject, when Escher produced the majority of his prints unaware of the mathematical principles he was using.

A tesselation is a pattern or mosaic of individual shapes which fits together to cover a given area without leaving any gaps. Thus a chessboard is a tesselation of squares and a honeycomb one of hexagons – but the shapes don't have to be as regular as these.

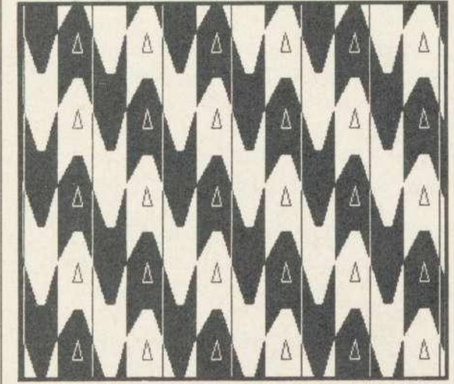
Mathematically there are 17 ways of constructing tesselations of one or more shapes, and both these packages can cope with all 17 groups. Each sets about the process in a rather different way, though. Both products are available on disc, and the Addison-Wesley tesselator is also published in a cassette version.

The Cambridge University Press (CUP) product comes on two discs, one for the program and the other containing a library of predefined shapes. The manual is well produced, with a number of sketches and screen dumps. It isn't a textbook on the subject, however, and assumes considerable knowledge. For instance, the section on decorating a shape before tesselating it refers to the symmetry options you may choose – '12MGC4'. The 1, 2 and 4 options provide symmetry about that number of axes, M provides it about both diagonals, C about one diagonal and G builds in Glide symmetry. I'd like to know how the initial letters were arrived at, and what glide symmetry is anyway!

The tesselator itself is easy to use, and considerable thought seems to have gone into this area of the package. As far as possible, control is confined to the cursor keys, Return and Space ('only four keys', according to the manual). It is certainly simple to select the shape of the frame with which you want to start, to draw the outline in up to eight colours, and to decorate the completed tile. It's hard to erase a wrongly drawn line, but easy to start again.

A useful feature of the shape-drawing program is that the x and y co-ordinates of the cursor are displayed continuously. You can use these to draw accurate figures, rather than having to rely on the acuteness of your eye.

When you tesselate the shape you've constructed, you choose the scale and the program then fills the screen with a mosaic of the pattern you've created. You can print the pattern on an Epson-compatible printer, and store the basic shape on the library disc. There is a wide variety of pre-defined shapes supplied and many of these are multicoloured, although there is no facility to colour-fill them.


Addison-Wesley's *Tesselator* is easier to follow for the hobbyist who knows little of the subject

The Addison-Wesley tesselator also provides facilities to store and print your creations, but builds the individual shapes in a rather different manner. The 'SHAPER' program provides you with an initially square frame, with a cursor positioned at one of its vertices. You can move the cursor around the square using the 'C' and 'A' keys to move clockwise and anti-clockwise. The four cursor keys distort the frame in four directions and its opposite edge moves in unison to ensure that the figure will tesselate.

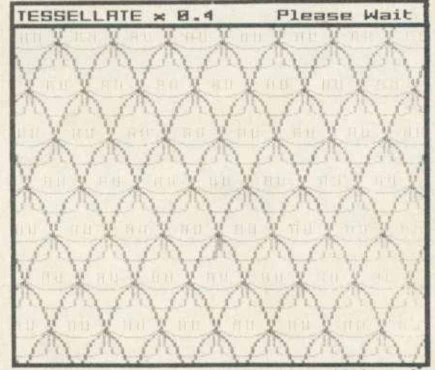
The program gives no guidelines on the position of the cursor, so all your designs have to be drawn by eye. This isn't very easy, and you will probably require quite a bit of practice before you can copy any of the designs in the manual. You can tesselate the figure at any stage in its creation and, whereas the CUP tesselator draws all the tiles in a mosaic at once, the Addison-Wesley program draws them tile by tile, and rather more quickly.

Once you're satisfied with the outline of your shape, you can decorate it by running the 'DECOR' program, but only after you've saved its outline to tape or disc. 'DECOR' demands that you reload the shape before you start. It would have been useful to have been able to carry forward the shape from one program to the next.

You can draw any number of decoration lines within the area of the tile, but any lines which go outside its boundaries will not be drawn when you tesselate the shape. You can save the decoration separately from the shape outline, so you could have several designs for the same shape.

When you've drawn the shape, you can experiment with different colours in the tesselation by first painting the tile. The mosaic produced will consist of tiles of alternate colours. The colour palette can then be changed to any combination of two colours, or you can opt for a lower resolution mode and choose up to four. It's satisfying to play with the colours in this way.

The Addison-Wesley package also includes separate programs to produce triangle mosaics, patchworks and Penrose tesselations. The latter are patterns made up of a combination of two predefined shapes, known as the Penrose 'kite' and 'dart'. Some quite spectacular patterns may be created with just these two designs.



***Tesselations* from Cambridge University Press is simpler to use and faster if you have some experience**

The Addison-Wesley manual, which is over twice the size of the CUP one, is much more useful and contains 160 black and white screen dumps. These cover various tesselations, most in the style of Escher.

Both the tesselators are worthwhile products which offer an easy way into a fascinating subject. They would be of use to interested hobbyists and also teachers who want to add life to maths coursework on tesselation. As a hobbyist rather than a teacher, I found the Addison-Wesley program easier to follow, and it offers the extra patchwork programs 'for free'. The CUP package is simpler to use, however, and if you already know something about the subject, you may be able to produce finished mosaics more quickly than with the Addison-Wesley program.

Simon Williams

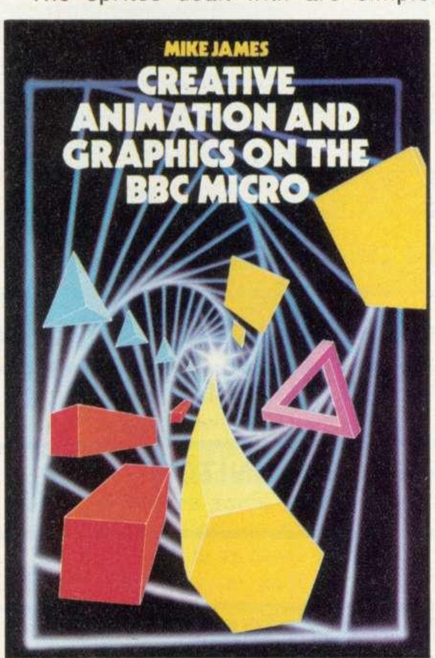
Graphic guide

'Creative animation and graphics on the BBC micro', Mike James, Collins, £7.95

THIS book is aimed at those who already have some programming experience and want to learn more about microcomputer graphics. Although a reasonable knowledge of BBC Basic is assumed, the early chapters provide a fairly comprehensive summary of the BBC micro's most important graphics facilities. The rest of the book is divided into three main sections – animation, co-ordinate graphics and concludes with co-ordinate-free graphics.

The two chapters on animation are confined largely to sprite graphics. While sprites are usually associated with games programs and therefore are liable to be dismissed as trivial, Mike James makes the valid point that computer games have, in fact, forced graphics programming on micros into areas previously considered impossible and which would otherwise not have been attempted.

The sprites dealt with are simple



user-defined characters rather than the multi-colour type – understandable as the book confines its programming to Basic and the latter would require the use of machine code.

The way in which the movement of sprites can be controlled is covered in some depth, including position, velocity, acceleration, collisions and explosions.

The major section of the book on co-ordinate graphics, offers quite a few potentially useful routines for those interested in developing their own CAD programs.

The chapter on lines and curves includes a recursive spline curve program which enables smooth curves to be generated by simply defining a few key points – a sort of software 'French curve' if you like. The program allows individual points to be moved by cursor control to influence the overall shape of the curve.

The following chapters deal with two-dimensional transformations and screen windows (mainly from a practical point of view but with a minimum of theory for those interested in finding out 'why' as well as 'how').

A line and point editor program is developed in several stages, and will allow shapes to be defined and then positioned anywhere on the screen. One possible application for a program like this, as the author illustrates in the book, is the drawing of circuit diagrams.

A chapter on three-dimensional graphics deals with 3D transformations and develops a 3D viewer program which will allow wire-frame objects to be viewed from any angle.

The concluding chapter in this section deals with the problems of achieving realism in computer graphics, covering such topics as hidden line removal, shading and stereoscopic images. In contrast with most of the other chapters there are only two practical program examples. The rest is a discussion of various ideas which should nevertheless provide food for thought for the more adventurous programmer.

The final section on 'artistic' or co-ordinate-free graphics concentrates on ways of drawing on the screen interactively, without having to specify co-ordinates – that is controlling the graphics cursor by means of a joystick, the cursor keys or an alternative input device.

A number of ideas on filling and the implementation of various 'brushes' are given, along with 2D and 3D sketch-pad programs.

Throughout the book theory is included where it is considered desirable but the main accent is on practical ideas.

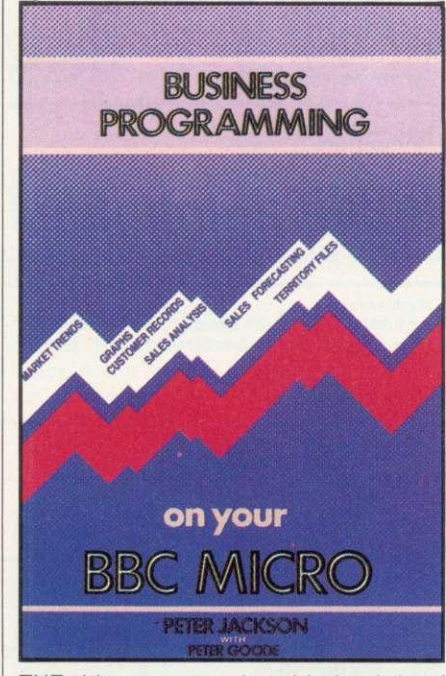
Although a number of complete programs are included, the book endeavours to arm the reader with sufficient knowledge to develop his or her own programs. The programs, which are well structured and therefore easily modifiable, could well be considered as starting points for larger projects.

Anyone who meets the requirements of having a reasonable knowledge of Basic and an interest in graphics should be able to benefit from Mike James' book.

Malcolm Banthorpe

Sold on the Beeb

'Business Programming on your BBC Micro', Peter Jackson with Peter Goode, Phoenix Publishing Associates, £7.95



THE title suggests that this book is of more general interest than it actually is. It is designed for sales and marketing managers who would like to do simple sales forecasting on their Beebs.

After a brief introduction and some general thoughts about the role of the computer in the sales environment, the book enters the world of programming, with two chapters introducing the reader to Basic. These are quite good as far they go, but it becomes apparent that the authors are using old-style Basic programming techniques, with GOTO and GOSUB to build up their program examples. Although they are using BBC Basic they do not use the facilities provided for better structured programs – there isn't a REPEAT . . . UNTIL or a PROC to be seen.

The book then goes on to specific applications, which include simple trend adjustment of monthly sales figures to allow for inflation or number of working days; plotting of graphs and bar charts; sales forecasting using exponential smoothing; a simple database for customer records; and finally, a design for combining all the above into one program.

These programs are well designed but are in pre-BBC Basic, although to be fair, the GOSUB routines are well separated using suitable numbering.

The book is a good introduction to what can be done on the BBC micro to help in sales analysis, but should not be used as a primer in BBC Basic programming.

John Vaux

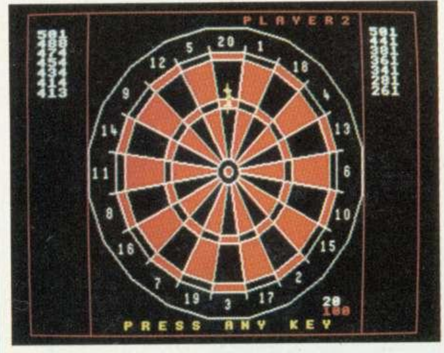
Not quite the local, but fun

'Darts', Blue Ribbon, (0302) 21137/8, BBC, £2.50

SO there I sat. All alone with my can of light and my Beeb, wishing I was down at the pub. Well at least I can have a game of darts to while away the time, I thought. So I loaded up this tape, vacuumed up the crisp crumbs from the keyboard, and started to play.

A choice of three games – 501, Round the Board, and Cricket – all standard at the local. I elected to play myself at 501 – at least that way I could be assured of winning!

I liked the pleasant procedure of drawing the board, though later I became a little irritated by its slowness. Anyway my score was shown on the chalk board, and my 'dart' was quivering away – I knew I'd had a few, but my hand isn't usually that unsteady! The blasted dart wouldn't keep still while I aimed! So I concentrated on treble 20,



threw, and scored one – just like down the pub.

I improved with practice, and evolved some techniques for overcoming to some extent the in-built DTs. I found there were some shortcomings in the games – eg, an inner wire is counted 'out' while an outer wire is 'in', and occasionally a shot that was clearly 'in' was scored 'out'.

But the worst part was that when I eventually scored 180 there wasn't even a little jingle, let alone a round of applause!

The other games are fun for a change. Cricket is standard – one side scores 'runs', the other side goes for 'wickets' (two for a bull, one for an inner). I found the way of deciding how many goes you had in the Round the Board game different to my expectations, but you may be used to more generous rules than me.

It's available on tape but is transferable to disc with a shifting routine, and works from the keyboard or using one or two joysticks.

It's a good game, though. It lacks the social appeal of the real thing but it's fun for parties, and at least you don't get dart-holes in the plaster playing it.

George Hill

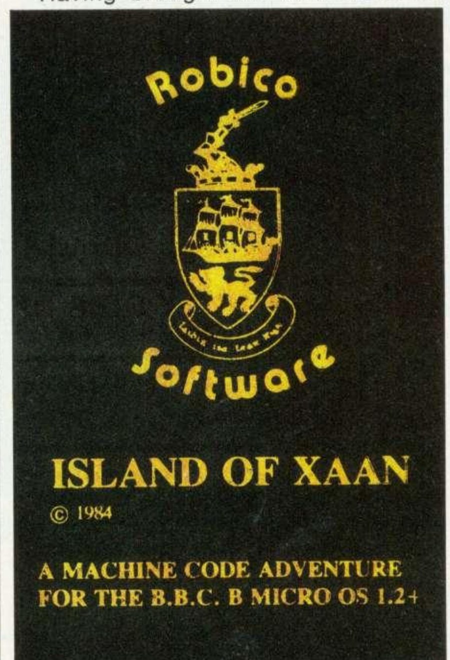
Zany Xaan

'Island of Xaan', Robico Software, BBC, £7.95 (cassette), £9.95 (disc)

ARTHUR Blenkinsop is really the Colonel's mother, so watch out for the socks. Hushabye and goodnight. That's all I'm prepared to say at the moment. Some of it might help you if you have the faintest idea what I'm talking about. But some of it wouldn't. I tell lies, see.

While not at the same pitch of difficulty as the Level 9 adventures (but what is?), *Island of Xaan* will make your head go funny. The storyline is that you have been incarcerated by an evil king. The first task is to escape from the cell and then make your way round the island collecting a disguise and enough precious objects to pay the ship's captain to take you away from all this. Of course, there are other doodas to be found and used on the way, but my lips are sealed. A few mazes add to the confusion.

Having brought the full, awesome



power of my intellect to bear on the first problem to be solved, the children decided we would stand a better chance if we cheated. Looking through the keyword and object tables helped quite a bit and we were able to reach the open air. This policy of swizzing was fairly rewarding, and, combined with the other tactic of phoning the nice man at Robico on numerous occasions, proved conclusively that I was more than a match for this adventure. Even so, it took the Sinclair Escape Committee about three days to reach freedom of the briny.

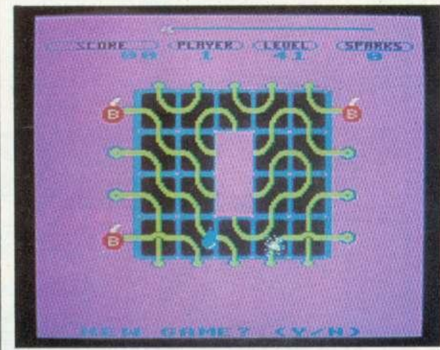
This isn't one of those impossible adventures, just difficult. It's also great fun and we all enjoyed it, even Rasputin. It has the usual save and restore facilities and is nicely written. Text only, but I think I prefer that. Warmly recommended.

Harry Sinclair

Smooth confusion

'Confuzion', Incentive Software, BBC and Electron, £6.95

AN arcade-style game that requires a lot of thought used to be a rarity. Happily the days of the simple 'zap-em-up' game are finally coming to an end, and *Confuzion* is one of the better examples of the new thought-provoking generation.



The scenario is a vast 64-storey automated industrial plant. Each storey consists of a grid of blocks on which there are sections of path. Around the edge of the grid are located bombs which you must destroy. This is done by guiding a spark to each bomb before the fuse at the top of the screen burns away completely. The spark follows whatever path it happens to be on, so by sliding the blocks around you can control its progress. Be warned though. As the game progresses this becomes very difficult. Trying to 'extinguish' your hopes of success is a droplet of water – if it touches the spark it will put it out!

The graphics are very smooth and clear, and good features include a two-player option which allows you to define different control keys for each player. Recorded on the reverse side of the cassette is *Confuzion – the music* by Private Property, following the recent trend to give music away free with software. I was disappointed with the sound on the game, however – I think we've come to expect more than a few bleeps from software of this standard.

If you like games which require quick-thinking rather than a quick fire-button finger, then this game is probably for you. **David Acton**

STRIKING A BALANCE

Colour text and graphics from Epson: George Hill puts the JX80 colour printer through the hoops

IN the past I've reviewed the Canon PW1080A colour ink-jet and the Seikosha 700A impact dot matrix colour printers – but if you want colour for graphics while keeping good text quality neither strikes the right balance.

The Epson JX80 is more akin to the Seikosha than the Canon. It is an impact dot matrix printer, bearing more than a passing resemblance to the Epson FX80 – it has the same horizontal dimensions but is rather deeper to house the ribbon changing mechanism. The four-colour ribbon has strips of yellow, magenta, cyan, and black, and is in a cartridge. Red, green and blue print is obtained by over-printing. The colour system is discussed in more detail in relation to the graphics capability. The front-mounted tractor feed pulls fanfold paper through the printer. Thank goodness for the demise of the awful FX80 pinfeed system!

Colour	Binary	Decimal
red	001	1
green	010	2
blue	100	4
When combined these give		
yellow	011	3
magenta	101	5
cyan	110	6
white	111	7
black	000	0

Table 1. The red/green/blue colour system

Text

When switched on, the printer behaves as if it was an FX80 in almost all respects. The black ribbon is the default and the full range of FX80 features is available. They include the full range of print styles, proportional spacing (in pica print only), download (user-definable) characters and full highlighting facilities. A summary of the JX80's capabilities is in the box on page 169. The Epson FX80 was reviewed in *Acorn User*, October 1983, where you'll find details of the shared black-and-white capabilities.

The coloured ribbons can be selected by the sequence ESC r n where n is a number between 0 and 6. Thus:

```
10 VDU2,1,27,1,ASC"r",1,1
20 PRINT"HELLO"
30 VDU3
```

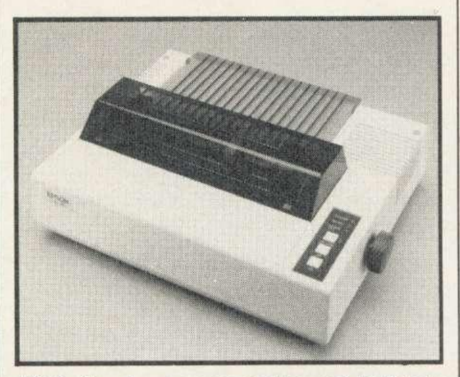
will print a magenta "HELLO". If you change colours a lot in a line of print, it's advisable to select unidirectional print mode (ESC U 1), otherwise the print head buzzes back and forth like a demented yo-yo. As with the Seikosha GP700 it is not possible to print on a coloured background – a feature of the Canon ink-jet colour printer I found very attractive – but all other textual features operate in colour as in black and white. Figure 1 shows off most of the text functions.

The colour system

Colour on an impact printer is obtained by having ribbons of the three 'secondary colours' – yellow, magenta and cyan, and one of black. The primary colours can be built up by the following combinations:

red = yellow + magenta
green = yellow + cyan
blue = magenta + cyan

Note that white = no colour and black = yellow + magenta + cyan.



JX80: 'the best compromise yet between good text capability and colour'

Now the red/green/blue system works on most computers by coding the three primary colours on separate bits (or several bits if intensities can be varied) and combining them. These are summarised in table 1. If we reverse all the bits of red/green/blue system, we arrive at a yellow/magenta/cyan system as illustrated in table 2.

Colour	Binary	Reverse	Decimal
black	000	111	7
red	001	110	6
green	010	101	5
yellow	011	100	4
blue	100	011	3
magenta	101	010	2
cyan	110	001	1
white	111	000	0

Table 2. The yellow/magenta/cyan colour system (reverse of table 1)

Looking at the reversed binary numbers you notice that yellow, magenta and cyan now have only one bit set to 1, and the other colours can be made up by combining the bits of these new 'pseudo-primary' colours. Logically, therefore, yellow is colour 4, magenta colour 2 and cyan colour 1. Unfortunately Epson in their wisdom (or lack of it) have mixed up the bits!

First, the good news – on the JX80 yellow is colour 4. Now the bad news – magenta is colour 1 and cyan is colour 2. This gives the crazy mixed up colour pallette illustrated in table 3.

All this would pale into insignificance if the colours were brilliant! Unfortunately they are pretty awful. Epson don't pretend to blue or red, calling them violet and orange. There was no serious colour problem on the Seikosha with a similar four-colour ribbon system, so this can only be due to a poor choice of inks.

These poor colours really spoil an otherwise very capable and desirable printer. Come on Epson, change your inks, and make passable into excellent!

Continued on page 169 ▶

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Screen dump

The mixed up colour palette makes life very awkward for the unfortunate screen dump writer. I'll go through the requirements of a screen dump step-by-step.

1. Direction – the printer has 'no distortion' plotter graphics. Since only 576 dots can be printed in the horizontal direction in this mode we have to dump with the Y axis (256 pixels) across the paper, with two dots per pixel. The X axis will be down the paper.

2. Colour – the picture should be in physical colour rather than logical. This means reading the pixel's logical colour, then reading the palette.

3. Passes – the picture must be printed in at least three passes (one for the yellow ribbon, one for magenta and one for cyan). On each pass you only want to discover whether the pixel contains an element of the current colour in its make-up. In practice over-printing yellow, magenta and cyan produced a rather poor approximation to black and I eventually decided to print in four passes, one for each ribbon colour. The manual recommends the order yellow, magenta, cyan, black.

4. Printer linefeed setting – it's necessary to over-print one line by another without any linefeed. It is therefore essential that the Auto-Linefeed be set off on the appropriate DIP switch (identical to the FX80's), and incidentally means the use of *FX6 for all normal printer use.

5. Mode – the initial dump was written to deal with modes 1, 2, 4 and 5 only. Later refinement added a mode 0 facility by a minor adjustment in the 'modecheck' subroutine. An increase in speed for modes 2 and 5 was investigated, but it was discovered that the printer was working flat-out anyway, so this was dropped. The description ignores the mode 0 adjustment, and assumes a square pixel like those in modes 1 and 4. The rectangular pixels of modes 2 and 5 are read and printed twice.

Each pixel will be represented by four printed dots in a square. Once the byte representing the four pixels has been prepared it is printed twice and then proceeds to the next column of pixels.

The whole process depends so heavily on rotating bytes that I decided a section of assembly language was essential at the heart of the dump, otherwise the speed would be intolerably low. The first hybrid dump worked as follows:

a) Set X and Y to screen bottom left.
b) Read the colour of a pixel in red/green/blue form.
c) Adjust yellow/magenta/cyan form.
d) If it has a yellow content add three to the yellow byte. If it has a magenta content add three to the magenta byte. If it has a cyan content add three to the cyan byte.
e) Rotate all three bytes left two places
f) Increment X by four and check if we have finished these bytes. If not repeat from b).
g) Save all three bytes in 'line buffers', and increment the buffer pointer.
h) Decrease X by 16 for next byte.
i) Increase Y by four, and check for end of line. If not, repeat from b).
j) At the end of line print all three buffers out, changing ribbons between them, and linefeeding after the third.
k) Increase X by 16, and check for end of page. If not, repeat from b).

Listing 1 is the hybrid dump which resulted. It is really much too long, and to use it you must CHAIN it from the graphics program, and prevent the values of the program counter printed during assembly from spoiling the picture. It uses three pass buffered printing, and has a low tolerance for adjacent blue and black.

TEXT CAPABILITIES

Text sizes (characters per inch)
Pica (10)
Elite (12)
Condensed (18)
Condensed-elite (20)
All of these sizes can also be printed double-width.

Weights
Emphasised
Double Strike
Both
Proportional spacing (letters individually spaced) is available in emphasised pica mode only.

Highlights
Italics
Underline
Superscript
Subscript

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Full control of linefeed and form length.
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Listing 2 is a dump written using a very similar algorithm, and is a procedure in Basic. It is fully compressed, and hence totally incomprehensible. It performs a 'mini-dump' – one dot per pixel in mode 1, using the three pass buffered method – hence the rather purple black and the quite large memory requirement! To use it you MERGE it onto your graphics program (instructions in the User Guide), and insert the command PROCD where you want the dump to occur. It's very slow, owing to the large amount of multiplication which has to be done. A full screen dump takes about 25 minutes.

Listing 3 generates the full speed four pass super-duper dump, which sits in pages 9 and 10 (&900 to &AAB) for disc systems, and pages 12 and 13 (&C00 to &DAB) for the tape system. (Note the dangers of this location for tape, and re-locate the machine code elsewhere if necessary.) The algorithm is different from the previous one. It works as follows.

a) Set X and Y to screen bottom left.
b) Select colour and ribbon (by table lookup).
c) Rotate printer byte two places left.
d) Read the colour of a pixel (red/green/blue).
e) Adjust colour to yellow/magenta/cyan and convert colour seven (black) to eight for black ribbon.
f) If pixel contains current colour (bit test) then add three (or one for mode 0) to printer byte.
g) Increase X, and repeat from c) until end of byte.
h) Print byte twice.

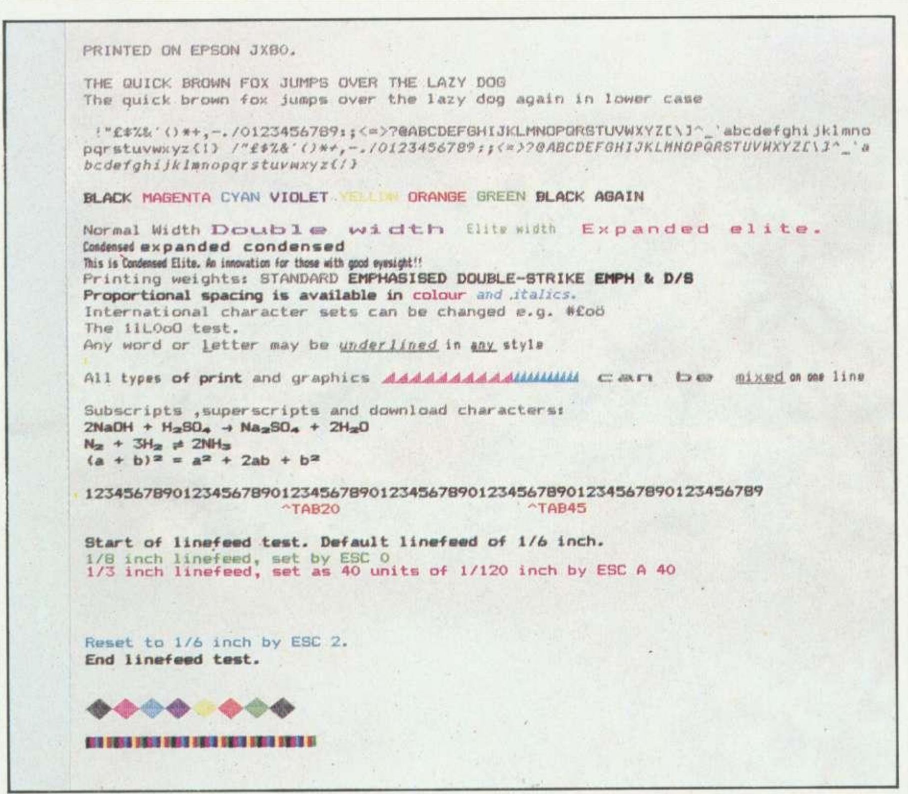
Colour	Binary	Decimal
black	000	0
magenta	001	1
cyan	010	2
blue	011	3
yellow	100	4
red	101	5
green	110	6

Table 3. The Epson yellow/magenta/cyan colour system

i) Decrease X and increase Y.
j) If not end of line repeat from c).
k) Send carriage return and reset Y. If not end of yellow/magenta/cyan/black sequence, repeat from b)
l) At end of sequence send linefeed and increase X. If not end of page, repeat from b).
m) At end of page send formfeed and then exit.

Listing 3 *SAVEs the piece of machine code called "JX80". This is the dump proper. From disc it can be called up by the command *JX80. From tape you can invoke it by *RUN JX80.

Continued on page 171 ▶


PRINTED ON EPSON JX80.

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
The quick brown fox jumps over the lazy dog again in lower case

!"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmno
pqrstuvwxyz{|} /"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'a
bcdefghijklmnopqrstuvwxyz{/}

BLACK MAGENTA CYAN VIOLET YELLOW ORANGE GREEN BLACK AGAIN

Normal Width Double width Elite width Expanded elite.
Condensed expanded condensed
This is Condensed Elite. An innovation for those with good eyesight!!
Printing weights: STANDARD EMPHASISED DOUBLE-STRIKE EMPH & D/S
Proportional spacing is available in colour and italics.
International character sets can be changed e.g. #£oö
The 1lLOoO test.
Any word or letter may be underlined in any style

All types of print and graphics can be mixed on one line

Subscripts ,superscripts and download characters:
$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$
$N_2 + 3H_2 \rightleftharpoons 2NH_3$
$(a + b)^2 = a^2 + 2ab + b^2$

1234567890123456789012345678901234567890123456789012345678901234567890123456789
^TAB20 ^TAB45

Start of linefeed test. Default linefeed of 1/6 inch.
1/8 inch linefeed, set by ESC 0
1/3 inch linefeed, set as 40 units of 1/120 inch by ESC A 40

Reset to 1/6 inch by ESC 2.
End linefeed test.

Figure 1. The JX80's text functions, reproduced at approximately half original size



Figure 2. Mode 2 screens such as this test-card can be dumped using listing 3 on the yellow pages

Alternatively you can *LOAD JX80 and then call the machine code by CALL &900 or CALL &C00 as appropriate. A full screen dump takes about 15 minutes. Mode 0 can be dumped. "JX80" – the machine code dump was used to produce figure 2.

Listings 4 and 5, which produce figures 1 and 3, are on this month's listings cassette. Listing 5, the cat, was written by a talented schoolboy before he had grasped structured programming, but the results are superb.

Benchmarks

The speed quoted in the manual is 160 characters per second (cps). Using a benchmark program I found the average printing speed when using a single ribbon (ie, printing in black, magenta, cyan or yellow) is 94.7 cps. If a two pass colour is used, ie, orange (red), green or violet (blue), this drops dramatically to 19 cps, because of the many apparently ineffective movements at the end of each line every time a ribbon change takes place. Printing in many mixed colours on each line is even slower! With a colour change every two characters, requiring four passes per line, the benchmark reduced to 9.4 cps – a reduction in speed by a factor of 10. If you use emphasised double strike characters with a colour change every two characters the results are very attractive, but the benchmark has gone down to a remarkable 2.2 cps – they don't tell you that in the manual!

George Hill's printer test listings 1–3 are on yellow pages 109-112

Manual

The manual is very similar to that of the FX80. It is clearly laid out, and contains plenty of example programs in Microsoft Basic – ie, using LPRINT. It comes complete with erratum slip, but still lacks an alphabetical index. The erratum slip noted one important and one strange innovation. The download characters can be used when the printer buffer is also selected – unlike the FX80 – and also you can now have condensed elite type – useful only if you have very good eyesight!

Summary

This printer represents the best compromise I have yet seen between good text capability and colour. It is fast in black and white text mode, but considerably slowed down by the ribbon changing in colour. In graphics mode the choice of inks for the ribbons and a silly choice of colour codes spoil what could have been a brilliant printer.

The Epson JX80 colour printer costs £560 + VAT



Figure 3. This charming cat, devised by a schoolboy, was dumped on the JX80



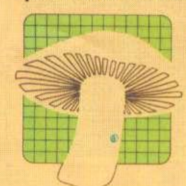


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Mushroom has answered a special need of all BBC computer users with their new WORKSTATION — no more untidy wiring, no more pulled plugs, transforms your system into a handsome console unit.

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* **ON BOARD REGULATED 4 AMP POWER SUPPLY WITH OVERLOAD PROTECTION**
* **MAINS INPUT FILTER FOR CLEAN POWER SUPPLY**
* **FILTERED POWER TO THE 3 TAKE-OFF SOCKETS AT REAR FOR MICRO, MONITOR AND PRINTER**

The WORKSTATION is manufactured to the highest safety specifications from lightweight aluminium attractively finished in oatmeal with orange trim. When not in use the computer is stored underneath, affording useful protection from accidental knocks or spillage.



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ALTRA ENIGMA DISC IMAGER

Enigma Disc Imager is a 16K ROM which will give you 29 additional powerful disc commands. Some of which are: Enigma will IMAGE ANY DISC, Copy sectors, Repair bad tracks, Read deleted or special sectors, Dumps roms to disc, Loads roms from disc to sideways ram, Moves a programme up or down in memory, Unlocks locked tapes, Locks your tapes, Dumps cassette to disc, Global or selectiverenaming of directories, Writes deleted or special sectors to disc, Track and sector ID editor facilities, Selective file copier, Formats discs to be 40/80 track compatible (requires an 80 track drive with this command), Special disc editor to cope with protected discs, Special formatter to format discs with non-standard tacks, Inserts new files into the catalogue, Enigma makes easy work of editing, copying, repairing, etc., of both standard and non standard discs.

ALTRA ENIGMA DISC IMAGER IS TUBE COMPATIBLE

ALTRA PROBE

Altra Probe is a 16K ROM which will give you 59 additional powerful machine commands. Some of which are: Altra Probe will list a basic programme straight from file, Formats basic assembler text output, Dissembles, Unpacks, Super Packs, Relocates, Edits memory, Switches off roms, Lists roms, Copies roms to specified address. Calculates free memory, Copies screen text to printer, Lists all specific types of basic variables and values, Graphics dump for Epson or NEC printers, Calculates and details free space on a disc, On board formatter which will automatically format a dual disc, On board formatter and verifier. Repairs bad tracks, Disc sector editor, Turns the tube on and off. These are only a few of the commands available from Altra Probe. Altra Probe makes easy work of editing, programme development, etc. Altra Probe is available in two versions. PROBE 1 and PROBE 2

ALTRA PROBE 2 IS TUBE COMPATIBLE

ALTRA BASIC ED

Basic Ed, is on 8K ROM which contains 21 additional commands. They are: $ search, List matches, Number matches, Global replace, Selective replace, Bad programme relink, Copy lines from one part of a programme to another, Format a listing, Move, Super pack, Renumber, Table line references, Unpack, Variables X ref, List entire programme, Keyboard immediate mode, Printer on/off, Paged mode on/off, List match lines, Concatenate, Strips rems, spaces etc. Altra Basic Ed. is an essential helpful tool for the Basic/Assembler programmer. Altra Basic Ed. is available in two versions. Basic Ed. 1 and Basic Ed. 2

ALTRA BASIC ED. 2 IS TUBE COMPATIBLE

ALTRA FIRST AID 1.1

First Aid 1.1 is an 8K ROM which contains 19 additional commands. They are: Machine code dissembler, Hex and ASCII dump. Sideways rom to ram copier, Function key predefined facilities, Variable table listing, Memory space free calculator, Checksum calculator, Rom lister, String search, Define function keys with strings, Rem and space Stripper, Bad programme fixer, Clear all variables, Clear ram from &0400 to &8000, Machine code monitor, Lists O.S. calls with their vectors, Lists the first 24 control codes. Altra First Aid 1.1 was designed to assist the Basic / Assembler programmer and the sideways rom user.

ALTRA TUBE EDITOR

Altra Tube Editor is a new and unrivalled full labelling disassembler and editor ROM for the BBC and the second Processor. Some utilities of Altra Tube Editor are append labels to those in memory, disassemble in 6502 and 65C02 minemonics, end file overlay, delete given label, delete hex range, delete markers, dump memory, edit memory, overlay files, find strings and bytes, define a hex region, define a label, list memory, load labels, list labels, set memory, calculate and print values, print embedded text in a program after a call, saves ROMS, saves labels. Altra Tube Editor also supports many of the 6502 "Illegal" opcodes.

ALTRA TUBE EDITOR FUNCTIONS IN THE BBC AS WELL AS IN 6502 SECOND PROCESSOR.







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PROBE 1	____ @ £35.00	____
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F/AID 1.1	____ @ £15.00	____
BASIC-ED	____ @ £30.00	____
BASIC-ED 2	____ @ £35.00	____
I enclose the sum of	*TOTAL*	£____

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GRAPHICS IN YOUR GRASP

Tony Quinn looks at books and David Acton at software in this graphics round-up

GETTING hold of a graphics program is no problem, but for many people thinking up ideas on how to use it – and then persuading the software to carry them out – often is.

First, where do the ideas come from? The answer is mainly from books and magazines on computer graphics. Although most of these are about pictures produced on mainframe computers – some on Cray supercomputers even – it's great fun and very rewarding seeing how close you can get with an Electron or BBC micro.

Take the example of 'Brilliance' – the robot on the cover. The original is from a TV commercial by Robert Abel Associates in California, one of the world's foremost computer graphics companies. We asked Malcolm Banthorpe, who also did the Coke can shown here, to see how near he could get. We leave you to judge the result.

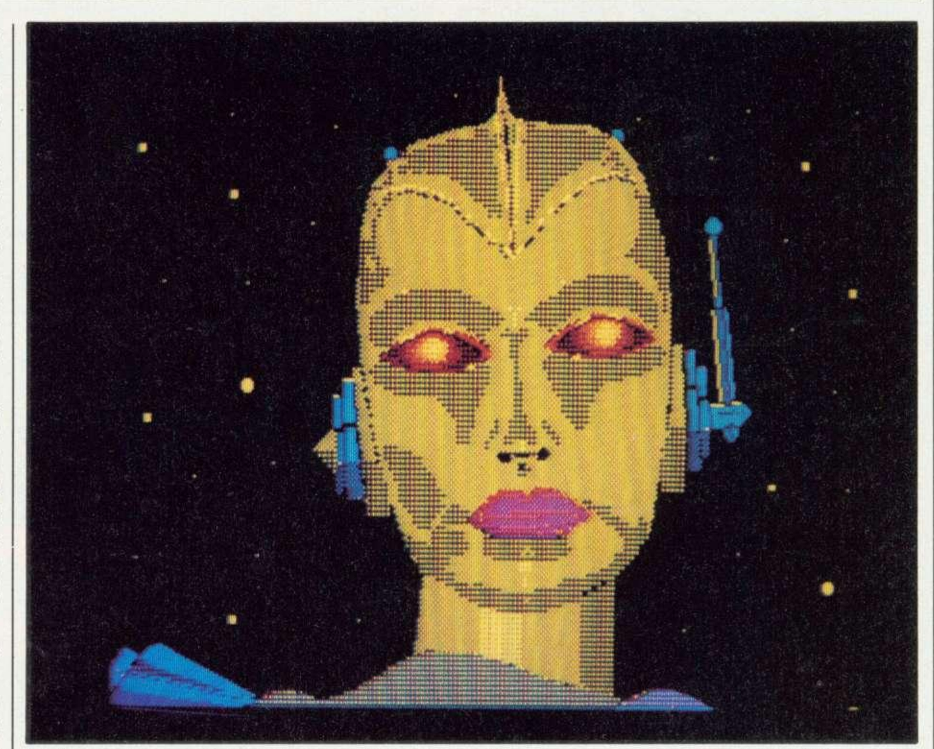
The Coke can was produced using a Grafpad and standard model B micro. Malcolm drew the shape of the can freehand on the Grafpad – using it almost as a 'pencil' – and wrote a Basic routine to reproduce the cylinder accurately. It was coloured using the Gaelsett ECFG package (sadly no longer available), but Acorn's Graphics Extension ROM would do the job also.

The robot face was done with a second processor and AMX Mouse. Malcolm's own software drew the face in mode 1 with the Mouse replacing the Grafpad 'pencil'.

The best book around for ideas is *Creative Computer Graphics*. (The authors were also behind Max Headroom – which wasn't done on a computer.) It's a superb coffee-table book containing hundreds of computer-generated pictures in colour and the history behind them.

Many of the techniques are simply explained, with examples from industry, film, art and television. *Tron*, *The Last Starfighter*, Channel 4's logo, the titles from BBC TV's *Sportsnight* are all there – and others almost too good to be believed. The front cover shows User Friendly, a real computer-generated TV presenter from an American film called *The Works*.

Once you've got an idea it's a matter



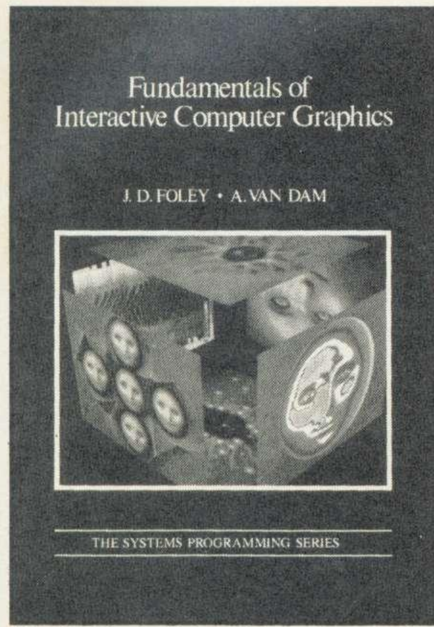
'Brilliance' was produced on a BBC micro with second processor and AMX Mouse by Malcolm Banthorpe



Malcolm's coke can was done on a standard model B using a Grafpad

ART IN ACTION

Spotlight on software



'The fount of all knowledge in computer graphics' – but heavy stuff

Graphics books

Creative Computer Graphics, Annabel Jankel and Rocky Morton, Cambridge University Press, £15.95.
Fundamentals of Interactive Computer Graphics, James Foley and Andries van Dam, Addison-Wesley, £22.95.
The Art of Micrcomputer Graphics for the BBC Micro/Electron, Jim McGregor and Alan Watt, Addison-Wesley, £14.95.

of trying to get your software to reproduce it. This is where you'll really test the computer packages, and no doubt want to either add to them or write your own for a special job. One good starting point is the packages printed in this issue and over the past year.

As far as programming is concerned, the fount of all wisdom in computer graphics is *Fundamentals of Interactive Computer Graphics.* However, this is heavy stuff, suitable only for those with a good knowledge of computing and maths (but it's got some good pictures too!).

More tailored to the Beeb and Electron is *The Art of Microcomputer Graphics* by McGregor and Watt. You'll see parts of the book serialised in the next few issues, and long-suffering readers will remember their series in *Acorn User* in 1983. Their style is fairly dry, but the listings make the book worth every penny. Again, there are lots of colour plates demonstrating the techniques and their results. Two software packages are released alongside the book.

THE excellent graphics facilities are one of the most renowned features of the BBC micro and Electron. Without a comprehensive range of graphics programs, however, any micro – whatever its graphics capabilities – would be no more than an expensive box.

Fortunately the range of graphics software available for Acorn machines is unsurpassed – the Beeb came top in this category in a recent *Which?* report. I'll be taking a look at some of the CAD (Computer Aided Design) and other graphics packages around. The large number available makes it impossible to test them all, so I'll highlight some of the better products.

Graphics packages are used in three main areas, which I've labelled serious, home and education. It would be wrong to think that all the products reviewed fall into one of these classes – they are just a general guide.

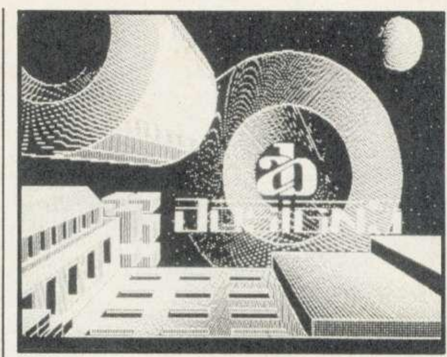
Four of the five packages from the serious range examined are supplied on disc, while *Novacad* from Technomatic comes as a ROM plus utilities disc. Only two are capable of using the 20k screen modes – *Diagram* from Pineapple and *3-D Graphics Development System* by Glentop. The rest operate in mode 4 although *Novacad* can use modes 0 and 1 with a second 6502 microprocessor added.

Two 3-D systems came under scrutiny – *3-D Graphics Development System* from Glentop and *3-D Design* from Software Classics. A simple 3-D system is also supplied free with *Micad* from Ellis Horwood.

I found the Glentop package very easy to use and its user guide particularly clear. This versatile design tool cannot really be compared directly with the Software Classics package which, at a fraction of the price, must be destined for a different market. However, the cheaper program is worth considering if you require a low-cost 3-D design system for general applications. A nice feature of *3-D Design* is the 'stereo' vision option, in the wake of the short-lived 3-D television experiments of recent years.

Another, *AB2*, is now almost three years old but still takes some beating. It was designed by a graphics designer and relies on the visual judgement of the user.

All the 2-D systems except *Micad*



AB2: designed by a graphics designer but relies on your visual judgement

allow the user to create diagrams several times the size of the screen. *Diagram* can scroll the screen very quickly to reveal other sections of your work. *Novacad* does so much more slowly, clearing the screen and redrawing as it goes. All packages permit 'zooming' – enlarging and editing particular areas.

Ibbotsons Design Software only provided me with a demonstration disc of their *DDX* system, taking the form of several impressive *DDX* screens. These contain details of the many functions available, including hatching and a 3-D 'umbra' shading effect. *Novacad* also has many 'special effects' including 36 user-defined icons which may be loaded/saved, displayed, rotated and reflected. This compares with 32 user-defined symbols on *DDX*. *Diagram* relies almost entirely on user-defined characters, even for drawing lines and this is a severe restriction.

Novacad enables the user to build up a diagram from several levels, for example, using one level for a floor plan and another for furniture. Levels other than the one you are working on can be shown dotted or in a different colour. *DDX* allows function keys to be programmed with a series of commands – a nice time-saving touch. All the 'serious' systems came with comprehensive instructions and the input/output options are summarised in the table.

Three of the packages slotted into the home heading – *Artist* by MRM Software (see footnote (f) to the table), Paean Systems' *Micro Artist* and *Leonardo* from Software Classics.

The last program is disappointing in terms of presentation but features

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some of the zooming and panning facilities you might expect to find on a much more expensive CAD system. It's also one of the few graphics programs suitable for both Electron and BBC micro, although I expect that Electron versions of many of the programs listed here are planned.

The two other home packages both make extremely good use of mode 2 graphics. *Artist* is controlled from a small menu at the top of the screen and features many shape-drawing and filling facilities. Excellent instructions are incorporated in the program.

Micro Artist uses 40 'screen boxes', 20 on each side. These contain 20 commands, 12 redefinable characters and eight colours – the selection of colours, etc, is by joystick only. Overall *Micro Artist* emerges as the best of the three, but none are intended for serious design work – they are aimed more at the fun market.

Two pieces of software can be classed as general as their possible applications are many and varied. One is a teletext screen editor – *Telefax '84* by Odyssey. This clever program allows a user to set up a database of up to 100 teletext pages which may be displayed sequentially – very much along the lines of Ceefax and Oracle. The graphics routines are limited, though. The line drawing routine is slow and it's easy to delete text accidentally with the graphics cursor, even without plotting any points. Compared with other systems (for example *Grafpak* from the *Acorn User* range which uses machine-code plot, draw and fill routines), *Telefax '84* seems a little under-equipped but it may be useful in the classroom.

Another general package is *Graphito* from Addison-Wesley. This consists of a large dictionary of Basic procedures that may be incorporated into your own program, together with predrawn motifs and alphabets. From the same publishers comes *Tesselator*, an equally well-presented and documented package, reviewed on page 161 of this issue. Both programs are available for the Electron.

The only program from the educational group to be looked at here is *Technical Drawing* by Jabtech. This program's predecessor came third in the BBC National Schools' Software Competition and, with many new features, the latest version will be a great asset to teachers, converting isometric projections to their orthographic counterparts at a touch of a button – this is a very nice package that deserves more review space than we are able to give it here.

Choosing the ideal graphics package can be a tricky and time-consuming process. Those examined here are just a sample of what is available. So, when searching for the ideal graphics software don't settle for second best – there are some excellent programs around if you look carefully.

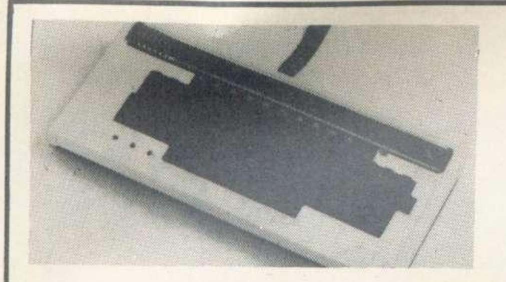
ADDRESSES

AB AB Designs, 81 Sutton Common Road, Sutton, Surrey
AW Addison-Wesley Software, Finchampstead Road, Wokingham, Berks RG11 2NZ
EL Ellis Horwood Software, Cooper Street, Chichester, Sussex PO19 1EB
GL Glentop Publishers, Standfast House, Bath Place, Barnet, Herts EN5 1ED
IB Ibbotsons Design Software, 'The Byre', Ecclesbourne Lane, Idridgehay, Derbyshire DE4 4JB
JA Jabtech, 488 Bury Road, Rochdale OL11 4DG
ME Microelectronics Educational Development Centre, Paisley College, High Street, Paisley PA1 2BE, Scotland
MR MRM Software (now Blue Ribbon Software), 2nd floor, Silver House, Silver Street, Doncaster, S Yorks
OS Odyssey Software, 8 Greenbrook Avenue, Hadley Wood, Barnet, Herts EN4 0LS
PA Paean Systems, Little Bealings, Woodbridge, Suffolk IP13 6LT
PI Pineapple Software, 39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL
SC Software Classics, 2 Connie Street, Openshaw, Manchester M11 2JD
TE Technomatic, 17 Burnley Road, London NW10 1ED

GRAPHICS ROUND-UP

Title	Maker	Format			Class	Output			Input		Price
		Tape	Disc	ROM/EPROM		Dot matrix printer	Plotter*	Keyboard	Joystick	Graphics tablet	
3-D Design	SC	●			g	●		●	●		£7.50
3-D Graphics Development System	GL		●		s	●		●			£25
AB2	AB	●	●		s	●		●			£51/£61
Artist	MR	●			h			●			£6.95 (a) (f)
CAD & Manufacture II: CNC Lathe Simulator	ME		●		s	●		●			£24
Diagram	PI		●		s	●		●			£28.75
Digital Drawings Extended (DDX)	IB		●		s	●	●	●	●	●	£125 (b)
Graphito†	AW	●	●		g			—	—	—	£22.95/£29.95 (a)
Leonardo†	SC	●	●		h			●	●		£6.95/£9.95 (a)
Micad	EL		●		s	●	●	●			£29.95 (c)
Micro Artist	PA	●	●		h				●		£7.50/£10.50 (a)
Novacad	TE		●	●	s	●	●	●			£79 (d)
Telefax '84	OS		●		g			●			£8.99 (a) (e)
Technical Drawing	JA		●	●	e	●		●			£28.75/£40.25
Tesselator†	AW	●	●		g			—	—	—	£21.95/£27.95 (a)

s – *serious applications*, h – *home use*, e – *educational*, g – *general*.
† *Electron version available.*
* *Plotters may be used with other packages than those indicated, by intercepting OSWRCH – the write-character routine.*
(a) *For hard copies save screen and use your own screen dump routine.* (b) *Add VAT and £2 package and postage. Original programs still available – 'Digital Drawings' at £65 and '3-D View' at £35. Other packages available including AMX mouse version.* (c) *Add VAT. Versions for use with joysticks, mice and lightpens expected.* (d) *Add VAT. Plotter driver optional. ROM and disc supplied together.* (e) *'Tele-ed '85' currently under development.* (f) *Not currently available though CDS plan to launch a version and dealers may still have stocks of the MRM product.*



The Microtest BCASE

Are you fed up with your computer looking more like a junior construction set than a piece of High Tech equipment? Is your computer case made of flimsy plastic? Does it sag when you put a book on it?

Now is the time to do something about it!!!

The new compact MICROTEST BCASE has taken over 18 months to develop by our R & D section. We feel (probably with some bias) that there is nothing currently on the market to compare to it!

The CPU housing is made from plated steel with an external acrylic bonded vinyl coating. So it's light, tough but good looking and just as important easily cleaned. It houses your BBC computer board (all issues of B and B+) and power supply, as well as single or twin 'half-height' disc drives if required. It maintains the use of standard BBC Computer connectors, and can if required be fitted with a 3" fan for additional cooling.

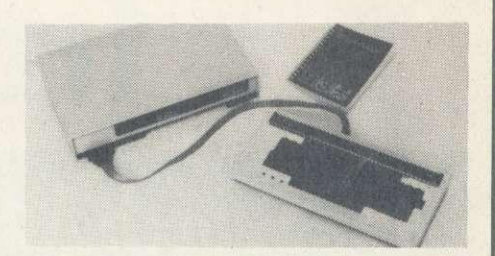
The BCK detached Low Profile Keyboard case is also made of steel and houses the existing BBC Computer keyboard. Inc. 600mm. cable.

The BCNK detached Low Profile Keyboard has a separate numeric pad for those of you that need fast and efficient numeric input. Inc. 600mm. cable and numeric pad. (A basic knowledge of soldering is required to fit the numeric keyboard and standard to this case option).

CPU Main board housing	**£53.00**
BCK Keyboard case	**£32.00**
BCNK Keyboard case	**£44.00**
3" Fan (Super Low Noise)	**£20.00**

80 Watt Switched Mode PSU inc switch, cable loom, etc	**£99.95**

Carriage £4.00 for keyboards, £4.00 for CPU case or £6.00 for keyboard & CPU case. Units are priced individually so that users could run a detached keyboard from an existing BBC computer, please state when ordering. We will install your components into our case for £20.00 (including carriage packing and insurance back to you), PLEASE PHONE US FOR A RETURNS NUMBER BEFORE DESPATCHING ANY ITEMS OF EQUIPMENT TO US FOR FITTING.



DisCat

DisCat creates disc labels and catalogues the files on all your discs, creating a wealth of information which can be accessed by DisCat's own built in database whenever you need to find a file or reference.

DisCat is easy to use and makes printing labels for your discs the simplest of tasks. Create labels for your whole collection of discs or just for one.

Additional information shows you the size of the disc (40 or 80 track, single or double density) and the amount of space used. Each disc is tagged with a volume number for easy identification. There is room for a comment on the label plus the data catalogued and the number of files present on the disc.

As each disc is catalogued you are given the opportunity not only to add comments to the disc label but to also make comments beside each file held on the disc. DisCat's built in database provides full database facilities allowing the resulting information to be searched for any filename or reference.

Discat uses standard sized labels and comes with 50 labels to get you going. Plus a comprehensive manual.

```
Title: *DisCat  *  Vol: v123
No. of files 12           :Cataloged 20/06/85
-----------------------------------------------
$.!BOOT   $.CatInit $.CatLbl  $.DaysX   $.DisCat
$.DiscMan $.Dummy1  $.id      $.Menu    $.System
$.ViewCat A.ViewCat
:Disc size 0400 Sectors,0165 used.:
-----------------------------------------------
Comment: Disc Catalogue Utility
         Published by
         M I C R O T E S T
-----------------------------------------------
```

Compatible with BBC B & B+ but must be an Acorn DFS

DISCAT – £14.95
Please add £1.00 P&P.

Microtest List Manager

A Data Filing System for the BBC Microcomputer

A disc-based database for the BBC model B on disc that is both sophisticated yet easy to use. LIST MANAGER has been specifically designed to introduce the newcomer to the concept of databases with friendly menus, command prompts, data entry and editing routines. With the aid of comprehensive and comprehensible documentation, the user is encouraged to make the most of the BBC's disc storage system and LIST MANAGER's data handling powers. Software features include the following:

(a) Records automatically sorted alphabetically as they are entered, and may subsequently be retrieved in their file sequence or alphabetically without need for slow sorting routines;

(b) Records may be up to 255 characters long, contain up to 255 fields, and need not be restricted to the size of the screen;

(c) Existing files may be restructured to increase or decrease particular field lengths, delete unwanted fields or even introduce entirely new ones, allowing you to completely reformat your file at any time;

(d) File size is limited only by disc capacity relative to chosen record length, permitting a typical file to contain between 1000 and 2500 records, or twice as many with the 80 track disc drive;

(e) Powerful search facility is provided and also a very friendly file editor;

(f) Address labels may be printed out from files, using your selection of fields.

(g) 'User option' allows you to write your own Basic routines to perform any desired calculations or manipulations on stored data.

LIST MANAGER is available from MICROTEST on disc with full manual at **£14.95** inc postage and packing. Please state 40 or 80 track when ordering.

Disc Menu ROM

Designed to save time and alleviate problems for the overworked user who needs to run programs from disc in a hurry. No need to worry about 31 files on a disc and trying to find the file required, hidden amongst other data files with similar names.

By simply pressing a number key in the range 0-3 and the BREAK KEY, the computer will 'auto menu' the drive number selected. Something that used to take a couple of minutes can now be done in as little as five seconds.

Also included in the ROM are many useful utilities, including:

CONCEAL REPAIR KILL ROMS CLOSE EX LEX FORM FREE MAP VERIFY LCAT REVIVE DEAD HIDE EXCLUDE REVEAL MENU.

Also included is REPAIR, an intelligent verify utility. So even if your disc does crash 'Menu ROM' can now try to repair it losing only a minimum of data.

A total of 17 EXTRA commands, at the very affordable price of **£12.95** INC VAT. **P&P £1.00.**

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It's here, the New Issue 2+ Starstick ROM & Quickshot Joystick

Picture shows Starstick ROM, Patchlead and Quickshot Joystick (along with Acornsoft's Elite Package – by kind permission of Acornsoft)

This new release of the very popular Starstick & Quickshot programmable joystick offers new possibilities. Over 30 extra commands which include: *Elite, *Replica, *Sneaky, *Plonk, *Adval, *Prop, *Kill, *Revive, *Reset, *Repeat, *Map, *Ksave, *Kload, *Cursor and *Stick.

Fully help driven format with 20 page manual including full fitting instructions.

Not only is the package fully programmable, but it's response time is also user variable. Thus giving YOU the ability to tailor the joystick to YOUR requirements, as only YOU can.

The new issue software is fully compatible with Disc versions of Acornsoft's 'Elite', Acornsoft's 'Aviator' and Clares 'Replica'. It features relocatable workspace to enable it to work with many of the few games it would not work with before. As in the previous issue, the Starstick ROM is fully 'TUBE' compatible.

Specifically designed with the Disc user in mind, the software is not affected by any combination of the BREAK, SHIFT, or CONTROL keys.

The self centring, rapid action Joystick plugs into the user port and is managed by the Starstick ROM. The ROM monitors O.S. calls and patches the joystick into games programs. The Starstick functions with most games and even those that are not designed to function with joysticks. IT IS VERY IMPORTANT HOWEVER THAT THE GAMES USE LEGAL OPERATING SYSTEM CALLS AS MOST DO.

The New prices are:

Starstick ROM (version 2+) and Quickshot II	**£29.50**
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Starstick ROM (version 2+)	**£19.55**
Starstick ROM Reprogramming Charge	**£5.50**

The Patch lead option allows you to plug any ATARI/SPECTRUM Style joystick into the BBC computer with the STARSTICK ROM.

PLEASE INCLUDE £1.00 for CARRIAGE and packing.

Also included in the package is a powerful ROM Manager to enable you to 'KILL' (temporarily) any ROMs that might cause you problems.

All commands in MICROTEST ROMs can be prefixed by 'M' should any other ROM try to intercept the same command name.

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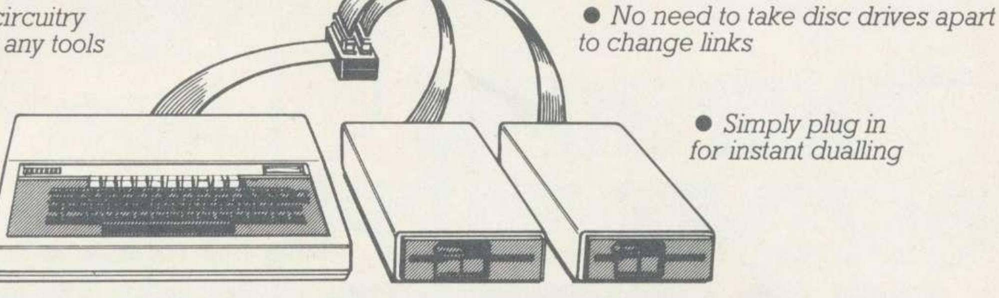
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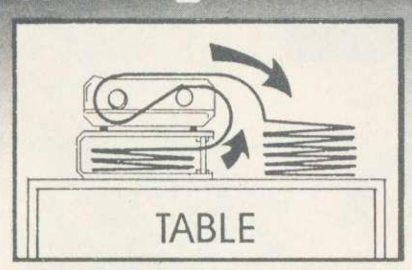


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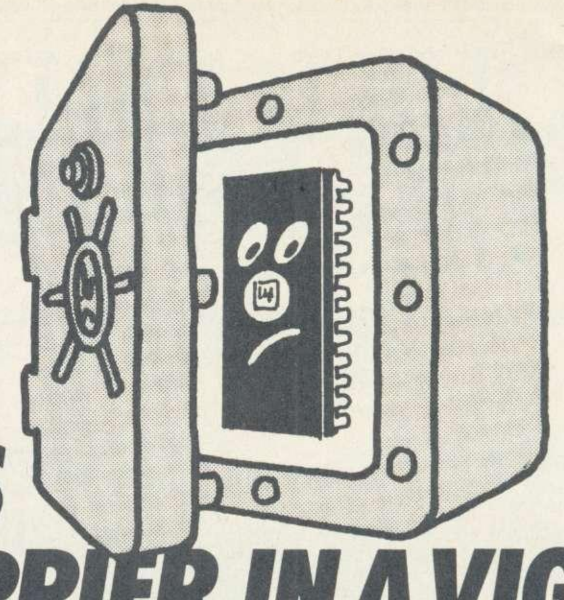
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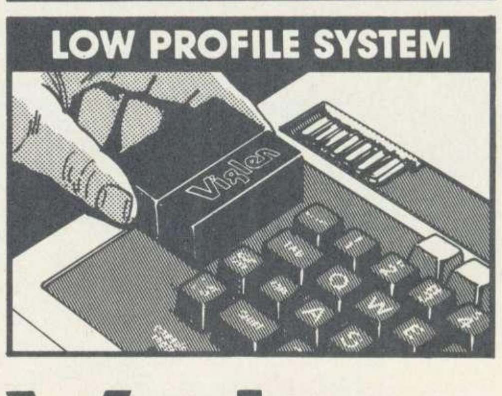
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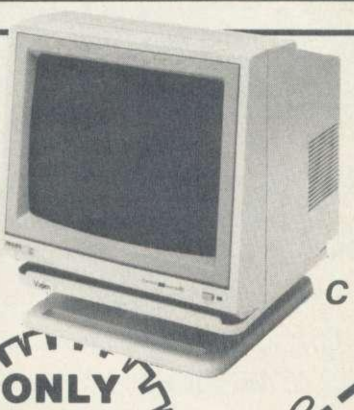
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Acorn User has been alerted to the abuse of the free ad service and, regrettably, can no longer accept entries selling or swapping software.

COMPLETE system, just 2 months old; BBC B/DFS, dual Cumana drives; Microvitec monitor (med-res); Torch Z80 card with business software. Cost £1550. Offers around £1100. Will consider selling items separately. Reading 789150.

SHUGART: Pair of 8in. drives including case and PSU, £80, or £40 each for bare drives. Hardware works with Beeb, but I have no time to fix software. Reading (0734) 690847.

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TORCH Graduate. Unwanted competition prize. Checked for working but otherwise unused. £750 – no hagglers. D Reynolds, Brierley Hill 263020. Buyer collects.

WANTED Atom formatting/utility disc and DOS manual. Andy Worrall. Phone 01-304 2214, evenings/weekend.

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BBC USER in Malta would like to correspond with penpal to exchange ideas, magazines, etc, on hardware and software. Write to Lino Delicata, 195 Tower Rd, Sliema, Malta. All letters will be answered.

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WANTED BBC pen-pal to swap info, hints, tips and programs. Anywhere. Write to Dean Gillings at 24 Healey Lane, Batley, West Yorks WF17 7ST.

ACORN teletext adaptor + TFS + manual £150. ATPL ROM/RAM board with 32k RAM + battery back-up £60. Ring 0635 41571 (Newbury, Berks), evening and weekends. Will exchange for 6502 second processor or monitor.

EXPAND your Beebs ROM/RAM potential – Sir Computers ROM/RAM board for sale. Expands ROM capacity to 16 sockets and maximum 16k sideways RAM capacity. £30 ono. Tel: 01-808 8906 after 6 pm.

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'INPUT' tutorial magazine numbers two to nineteen. Full of helpful routines, games and background information. Numbers twenty to fifty-two available at newsagents. Worth £17.10 – accept £10. Sutton, 01-644 2861.

BBC 1.205 + monitor + 100k disc drive with Acorn DFS. Also View and De-Bugger ROM. Discs, magazines, books, tapes, etc included. The lot for £500. Ring Liverpool 708 0908 after 5 pm.

WANTED: penfriend to swap games, ideas for BBC B. Write to: Rajeev Mehta, 22 Albert Road, Heaton, Bolton, Lancs BL1 5HF.

BBC!' Light Pen'! Where would you be without one? Made by Data Pen Microtechnology. Normally set you back £25. One year old, hardly used – original packaging, programs and instructions. £17. Ring Frazer on (0223) 870148 pm/weekend.

DISC drive. Teal FD55E 200k single sided. £85. Oxford (0865) 716045 evenings.

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FRENCH BBC user searching for correspondents in order to swap ideas and so on. Write to Mademoiselle Ferrer Fabienne, 136 Rue Championnet, 75018 Paris (France).

ORIC Atmos 48k + eight games inc Trouble in Store, Zorgon's Revenge + Advanced HCC 1-30 in binders + other literature. £100 ono. No callers. Martin Wilding, 25 Downs Road, Slough, Berkshire.

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BBC B including cassette and interface lead, books, mags, software including educational, games (Elite, 3D Bomb Alley, 3D Grand Prix etc), some business programs, 3 months old, absolutely as new, £375. Tamworth 287805.

HELP! Would someone please loan me information on the Acorn speech system, especially user guide? 13 Aysgarth Drive, Darwen, Lancs. Tel: 75314.

FOR SALE 400k doublesided 40/80 track switchable Opus disc drive. Under guarantee, 1½ months old, genuine reason for sale – buying a dual disc drive. Sell for £170 ono. Tel: 585013 Nottingham: after 6 pm.

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ACORN USER ADVERTISEMENT PAGES – OCTOBER ISSUE

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■ **Acorn Atom** FP ROM for sale £20 ono. Does anybody know the address of the Acorn Atom users group? Wanted – any Acorn Atom hardware or colour encoder card or Acorn System 1 computer. Please ring with details. Tel: J M Bonnett (0407) 810689.

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■ **BBC 64k** printer buffer for sale, can be used with any computer with Centronics printer port. £80 ono. Also for sale, 49 note C-to-C musical keyboard for BBC including software (was part of college project) £60 ono. For sale: General Instruments programmable sound generator chips, AY-3-8910 with data notes £3 each, reduction for quantity order. Wanted: power supply from BBC computer, good price paid for working unit. Tel: J M Bonnett (0407) 810689.

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■ **Get your** draws off! PAM – Pools Analysed Mathematically program based on league position and past performance. Cassette £5. J Wynmore, 34 Hill Road, Neath Abbey, Neath, West Glamorgan SA10 7NR.

■ **Solidisk** 32k sideways RAM, 5 utility discs. Incompatible with my new DDFS. £38. Watford 13-ROM expansion board, unused, fitting instructions, £20. Radburn, (0664) 822665.

■ **Centronics 739** printer ROM. Dumps colours shaded, *Command printer mode selection, Wordwise F keyset manual, utilities (state tape or disc). £25. Electrocomp, 5 Polden Close, Cove, Farnborough GU14 9HN.

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ACORN ABUSER'S Diary



These pictures are of the *Acorn User* staff and contributors making an exhibition of themselves at the recent Show. Among them are frowning Joe Telford with Mike Barwise, expectorating Bruce Smith, laughing Kitty Milne, grunting Tony Quinn, and (just sneaking a look-in) gnome-like Chris Drage. Anyone who recognises the legs can write in for a mystery prize, as can anyone else who recognises themselves.

Toys for the boys

WELL, it didn't take Cap'n Bob Maxwell long to tire of his new toy, namely Sinclair Research.

Barely two months after the fan-fared rescue, he dropped it late on a Friday afternoon (presumably so the other members of the Fleet Street back-stabbing fraternity couldn't get their exclusive-grabbing hands on such a field-day making story).

But, as usual, Sir Clive emerged from the mire – straight into the arms of Dixons with a face-saving £10m deal – with a lot less egg on his scraggy beard than the Captain.

If Brian Long, Acorn's latest pin-up, has any brains, he'll snap up Sir Clive as a PR man. There can't be any better.

An exclusive risk

HERMANN Hauser's running battle with the press continues. His stand-offishness has never appealed to the hacks, nor their rude, pushy tactics to him (not to mention their always spelling his name wrong).

At the announcement of the latest money-off Acorn package, he taunted the assembled journalists with his latest project, but refused to say anything about it – except that he'd given the story to an American magazine.

An *Acorn User* groupie immediately returned with the comment 'sounds a risky business'. This was lost on the hacks, but Hermann's face fell for a second as he knew it was 'RISCy' in the comment, rather than 'risky'.

Three weeks later, Acorn's business division sent out a press release announcing Acorn's 32-bit Reduced Instruction Set Chip. This chip can handle a limited set of commands, but very quickly, giving it tremendously fast benchmark timings – putting the Workstation to shame.

Poor old Hermann went on to say he'd given the exclusive story to the American *Electronics*, but those who read the lead story on page 7 of this month's *Acorn User* will already have the news.

Sincerest flattery

MIMICKING the pages of other magazines has become a trade mark of the Acorn Abuser Diary, since the first one appeared in the August 1984 issue (A Day in the Life of Hermann Hosewheel).

Other magazines and papers to receive similar treatment include the *Radio Times*, *Daily Express*, *Boxing News*, and most recently, the *Sunday Times*.

We can't claim to be original (*Private Eye* was there before us), but other computer rags are jumping on the bandwagon. *Crash* ripped off *Sinclair User* – and did it so well a court injunction was slapped on it.

Now *PCW*, which once set trends, has followed with a 'front page' from *The Mirror*. We don't mind all this but please, *PCW*, if you're going to do it, at least do it properly.

AU birthday basher lands in gutter

ACORN User threw a bit of a bash on the Thursday of the Show at one of London's premiere nightspots, Stringfellows, in celebration of the magazine's third birthday.

A good time was had by all, but by some more than others. Tim Coote, Commotion boss and one of the playboys of the computer world, failed to turn up on the Friday of the Exhibition.

It turned out that legless Tim, as he is now known, was being driven home while standing in the back of an open-top Ford Escort with a young lady. As the car went one way around a corner, they went the other.

No serious harm was done, according to Legless when he turned up on the Saturday, but both were bruised and the car minus one rear window. 'We just fell out on our first date,' the jesting Coote remarked.

Selling MUD to the USA

SIMON Dally, arch perpetrator of the dastardly competitions in this organ of some repute, was little to be seen at the *AU* Show. The reason is that he was recovering from a trip to the US of A, where he had been pushing the even more dastardly MUD adventure game (soon to launch in this country via British Telecom).

The mega comms corporation Compuserve was his target, so watch out you lot over the water.

Meanwhile, you can see a picture based on Simon's character opposite the diary of last month's issue.

The long and the short of it

LITTLE has emerged on the nickname front for the new Acorn MD Brian Long, apart from 'Oblong'. The reason? Well, apparently he's long (ie, tall) and obtuse.

Mr Long is also Canadian, which might explain why Acorn's sales force in London (a boot-licking lot at the best of times) have ear-marked the Maple Leaf in Covent Garden as their regular drinking hole.

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DeathStar



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THE WARRIOR ZONE.



THE DEATHSTAR BEING BOMBED.



CRYSTALS BEING EMITTED FROM A PLANETOID.

DEATHSTAR

is a fast arcade-style space game with stunning graphics and addictive action. Your "intelligent" opponents, the Workers and Warriors, each have several different tasks to perform: mining the Crystals held deep within the Planetoids, constructing the mighty Deathstar from these Crystals, guarding the Deathstar, attacking your ship, and sacrificially intercepting the Starbombs, with some jobs having higher priorities than others. You must amass a large supply of Starbombs by shooting the Planetoids and collecting the Crystals as they splinter off the Planetoids and hurtle through space. Once the Deathstar has been completed, it comes in rapid pursuit and can only be repulsed by swift and accurate use of the Starbombs. If you successfully destroy the Deathstar, you progress on to the Worker Zone, the Warrior Zone, the Planetoid Zone and the Void Zone (in which there are very few Planetoids present), with a bonus screen between each zone. A superb game, destined to become another Superior classic.

SPEECH COMPATIBLE

If you have an Acorn Speech Synthesiser fitted, you will hear spoken phrases: such as "BEWARE, I AM COMPLETE" when the Workers have finished building the Deathstar.

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